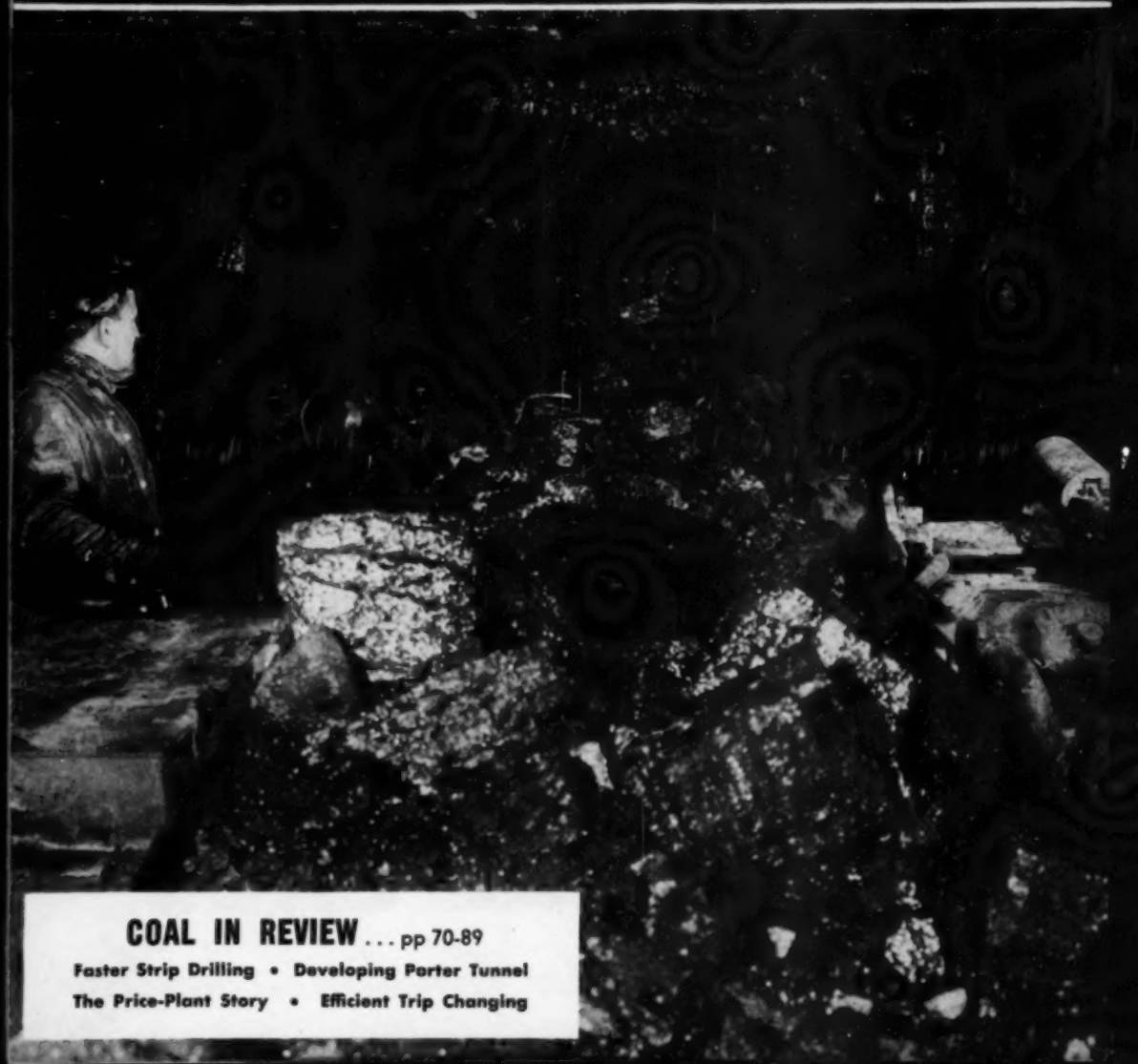
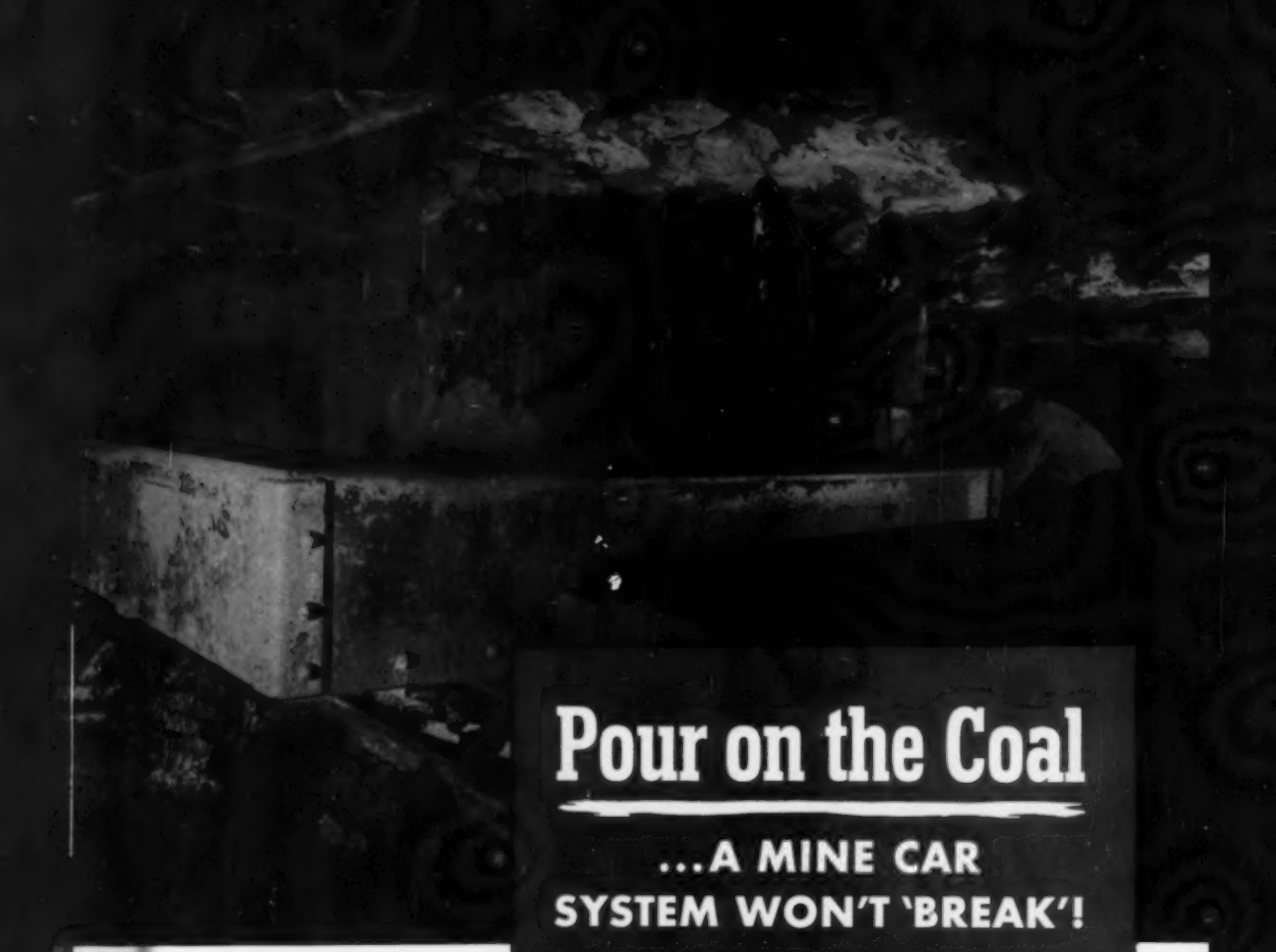
Coal Age



COAL IN REVIEW ... pp 70-89

Faster Strip Drilling • Developing Porter Tunnel
The Price-Plant Story • Efficient Trip Changing



Pour on the Coal

...A MINE CAR SYSTEM WON'T 'BREAK'!

In a hard-working mine, *all* machinery takes some rough, tough, abusive handling. *Some* machinery can't take it for weeks, months, years on end.

A modern mine car system *can*—as the production record shows.

Some* haulage systems will break down...shut down your mine until repairs are made. *Only then can coal move again.

But with mine cars, the occasional repair job won't stop anything but the one car that's being fixed!

If you want a haulage system to last the 'life of your mine', you need the constant haulage that only mine cars can give.

Next time you're planning a coal haulage system, let an A.C.F. Representative show you the advantages of constant haulage mine cars. American Car and Foundry Company, New York • Chicago • St. Louis • San Francisco • Cleveland • Philadelphia • Washington • Huntington, W. Va. • Pittsburgh • Berwick, Pa.

a.C.f. MINE CARS

for Constant Haulage

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Where slivers of coal used to needle rubber

B. F. Goodrich Cord Beltroad solves another problem

FINE anthracite coal — hard and sharp, like small needles — used to pierce ordinary belts at this power plant. Each tiny pierced spot would let in moisture through the cover and into the belt. The acid in the coal caused fast rotting, the belt wore rapidly.

The BFG man recommended the B. F. Goodrich cord conveyor belt. Length of service and tonnages have already doubled that given by ordinary belts, and the BFG cord belt is still in service.

Resists acid effects — Each lengthwise cord in the B. F. Goodrich cord belt is completely surrounded by rubber — no cross threads tie them together. With each cord — twisted tighter than ordinary yarn — sealed in rubber, cover cuts admit acid to only a few cords. No absorbing or spreading through the rest of the belt.

Resists cuts, gouges—With parallel cords in "live" rubber, under impact the rubber distorts temporarily; distributes and absorbs shocks that would damage a stiff, unyielding carcass, gives 2 to 6 times greater impact resistance. This impact cushion resists cuts, gouges. A *Transcord Breaker* floated above and across the cord section helps cushion impact, keeps cover from stretching beyond elastic limits. Provides better adhesion between cover and carcass.

Troughs better — Cord belts carry the load with less "spill". Even thick, narrow Cord belts trough naturally, keep centered on idlers, require less maintenance. Longer centers, higher lifts can be used. Creasing action between idlers is eliminated.

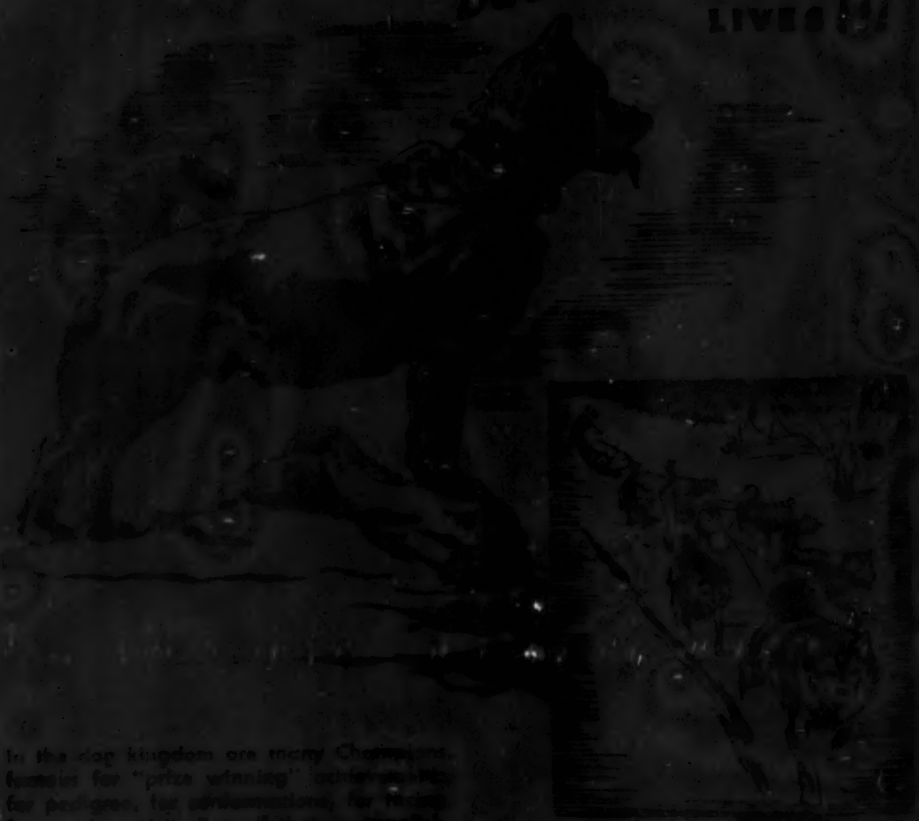
The material you haul may be large and heavy and drop onto belts with crashing blows. Or it may be fine, small but sharp and piercing. In either case, you can cut hauling costs with a B. F. Goodrich cord belt. Your local BFG distributor can begin by supplying you with full data and estimates. Give him a call, or write: *The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

Beltroads BY
B.F.Goodrich

The Champion

HE WON NO BLUE RIBBONS—

but **HE SAVED LIVES!!!**



In the dog kingdom are many Champions, famous for "prize winning" ... for pedigree, for ... for movie acting. But all ... pale before the performance of the great BALTO, the famous Eskimo dog who, in 1925, led the team carrying ... serum from Nenana to Nome, Alaska ... a diphtheria epidemic. There was no other way to get it there; and for a distance of over 600 miles BALTO fought and led the way through snow and sleet and ice, pulling the heavy sled with the life-saving cargo. His statue stands today in Central Park, New York City—a bronze memorial to a four-footed Champion whose fame is based on "work done" in terms of worthwhile service.

GILBERT OIL & GREASE COMPANY, PHILADELPHIA, PA.

Specialists in Coal Mine Lubrication

The Champion

...IN COAL MINE LUBRICATION

Hulburt Quality GREASE

"The Champion"

You don't want us to tell you what so many mining men already know—that HULBURT is "doggone" best, or that this grease is the life-giving "serum" in making coal mining machines run better. So just let us say that if your coal mining machines are storming off, like statues because of poor lubrication instead of WORKING—HULBURT QUALITY GREASE will make them go and deliver the goods and keep them going, smoothly and economically and profitably.

On the Job DAY IN AND DAY OUT

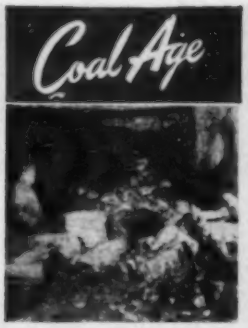
One reason preparation plant operators prefer the Bird Coal Filter for drying their fine coal is that the BIRD runs and keeps on running month after month. What little maintenance it requires is done at such times as the operator chooses. Maintenance cost varies somewhat with the type of coal but averages about 1 cent per ton of coal dried.

It will pay you to get the facts on Bird Coal Filter performance as applied specifically to your fine coal handling needs.

BIRD COAL FILTERS

BIRD MACHINE COMPANY

SOUTH WALPOLE • MASSACHUSETTS



THIS MONTH'S COVER

• MECHANIZED COAL PRODUCTION, the theme of this month's cover, will become increasingly important in 1951. Progress in this direction was accelerated in 1950, with new equipment and new methods laying the foundation for not only better stripping and deep mining, but for better preparation and greater safety as well. For an up-to-the-minute digest of coal's accomplishments in 1950 and how 1951 looks, see pp. 70-89.

COMING IN COAL AGE

• WITH MANPOWER, price and materials controls looming larger and larger in the national picture, March COAL AGE will lead off with a summary of what the present controls are, what are in prospect in the future and what the coal industry probably will have to do to adjust its operations.

• **Other useful articles** reporting methods and developments that will help coal discharge its defense obligations scheduled for March and subsequent issues include:

- **Pitch-Mining Development**
- **Big Cars to Improve Mining Efficiency**
- **Plastic Sealing of Stoppings, Roof and Ribs**
- **Kerosene Flotation**
- **Double-Shift Strip Loading**
- **The Short-Circuiting Contactor as a Mine-Safety Device**
- **Trends in Coal Preparation**
- **Cutting Strip-Haulage Costs With Better Engines**
- **Preventing Gob-Pile Fires**

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For your hydraulic mechanisms, above or below ground, use *Texaco Regal Oils (R & O)*. These turbine-grade oils manufactured to pre-

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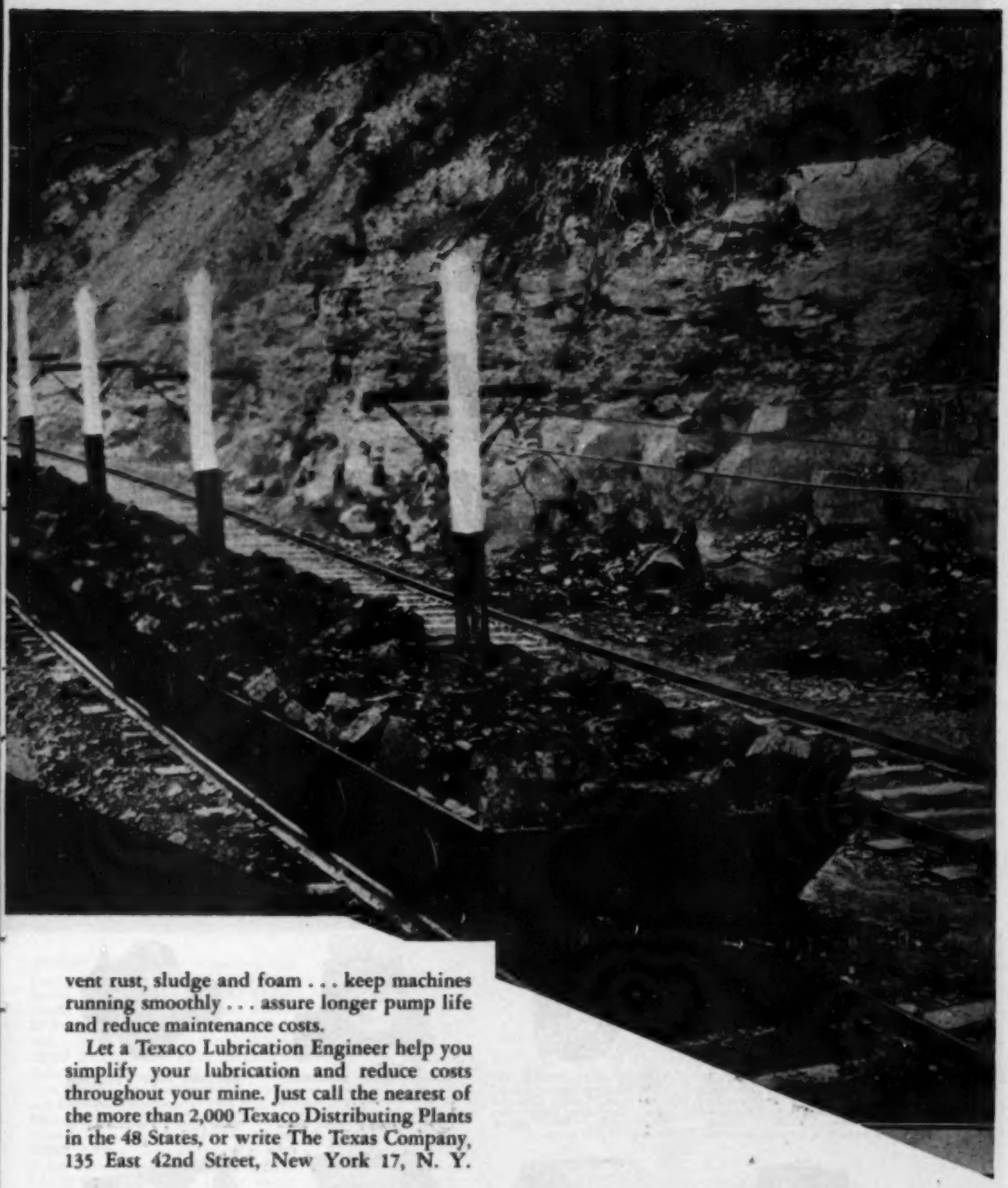
TEXACO LUBRICANTS



vent rust, sludge and foam . . . keep machines running smoothly . . . assure longer pump life and reduce maintenance costs.

Let a Texaco Lubrication Engineer help you simplify your lubrication and reduce costs throughout your mine. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

For the Coal Mining Industry

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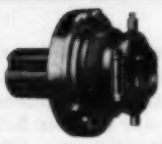
DODGE-TIMKEN BEARINGS: Another Dodge "first." Mounted units, proved in millions of industry's toughest jobs. Four types to choose from. Shaft sizes from 1-3/16" to 8".



ROLLING GRIP FRICTION CLUTCHES: Another Dodge "first." No toggles. Flexible, smooth. Bolted plate and gear tooth plate. 1.3 to 21.2 h.p. at 100 r.p.m.

SLEEVOIL BEARINGS: Another Dodge "first." Precision-built, quiet, dependable — "tops" for fan and blower service. Sizes 1-7/16" to 6" in both plain and water cooled types.

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USED CONFIDENTLY WHERE THE GOING IS TOUGHEST

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CALL THE TRANSMISSIONEER: Most Dodge products are normally available from distributors' stocks — in your territory — when you need them. For information on the newest and best methods of mechanical power transmission, call the Dodge Transmissioneer, graduate of the Dodge factory course. He is your local Dodge Distributor. Look for his name under "Power Transmission Equipment" in your local classified telephone directory.

PILLOW BLOCKS: Roller Bearing, Ball Bearing, Babbitted. **FLANGE BEARINGS:** Roller, Ball, Babbitted. **HANGER BEARINGS:** Roller, Ball, Babbitted. **TAKE-UPS:** Roller Bearing, Ball Bearing, Babbitted. **BASE PLATES. FLOOR STANDS. DROP HANGERS. V-BELT SHEAVES:** Both TAPER-LOCK and Bored-to-Shaft-Size. **BELTS:** Industrial and FHP V-Belts and Flex-Link Belting. **SPEED REDUCERS:** TORQUE-ARM Shaft Mounted Speed Reducers. **CLUTCHES, FRICTION:** Rolling Grip, Diamond D and Solid Types. **COUPLINGS:** TAPER-LOCK Flexible, TAPER-LOCK Rigid and Flange Types. **SAFETY SET COLLARS. PULLEYS:** Steel Split Transmission and Solid Steel Conveyor Pulleys. Rubber Lagging. **VISES:** SLIDE-SET Machinist's...FOR COMPLETE LINE, TYPES AND SIZES, WRITE FOR BULLETINS AND 224-PAGE CATALOG.

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"First in Power Transmission Machinery!"

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WHITNEY *Mine Proven* CHAIN

- **LOWERS COSTS**
- **SIMPLIFIES MAINTENANCE**
- **REDUCES INVENTORIES**

Now it's available! The *New Whitney Universal Joint Mine Chain* that is specifically designed for loaders — designed to take the rough abuse encountered in underground mine service.

Mine-Proven on loaders, this revolutionary chain gives you many exclusive features that keep loaders up-at-the-face getting out coal. Features that reduce loader down time, lower operating costs and simplify maintenance.

And here's another worthwhile Whitney Mine Chain advantage-*on-the-job* chain repairs. All you need is a wrench, hammer and a few sections of packaged chain and flight assemblies. This means repairs when needed are quickly and easily made down in the mine. There is *no* lost time taking the loader to the repair shop. It stays on-the-job getting out tonnage.

Investigate Whitney Universal Mine Chain, today. See for yourself how this new chain can help you maintain profitable production.

LOOK AT THESE FEATURES!

1. Easy maintenance and repair with exclusive Whitney "Mine Chain Assembly" construction.

2. Basic chain is roller type with rigid stud bushings. Riveted construction eliminates cotter pins — assures tight plates.

3. Whitney design eliminates packing of dirt and grit between chain parts. Proper clearances are built into chain for necessary joint freedom.

4. New flight design eliminates localized stresses in flight studs and possibility of loose flights. Ruggedly built of high strength, ductile castings—are designed to act as connecting link between chain sections.

5. Flights are firmly secured by accurate taper fits and are machined to close pitch tolerances.

6. New design of Universal Joints with heavy, flanged sections gives longer life and protects flush headed swivel pin.

7. Large diameter pins are through-hardened for shock resistance.

8. Nuts are self-sealing and locking, assuring corrosion protection to threads and maintenance of original tightness.

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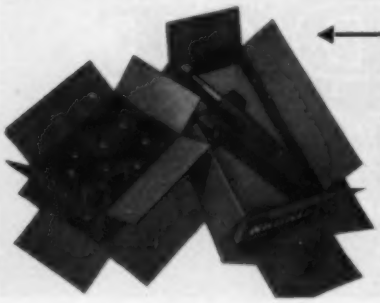


The chain sections and flight pitches are carefully packaged at the factory for protection. The tough, sealed box keeps out moisture, dirt and dust . . . assures proper prelubrication. All the elements required to assemble Universal Joint Mine Chains are contained in small, easy-to-handle cartons. Cartons conserve storage space — permit shelve stocking — provides accurate inventory control. Clearly labeled with prominently featured part numbers, permits easy, correct selection of chain.

Get in touch with your local Whitney Distributor. He'll gladly supply you with expert advice on your drive problems. Or, write us for information on this Mine-Engineered Whitney Loader Chain!

WHITNEY CHAIN COMPANY

210 HAMILTON STREET, HARTFORD 2, CONNECTICUT

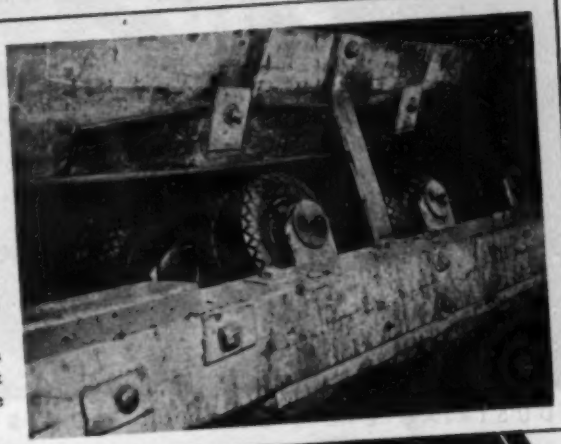
Double Tonnage

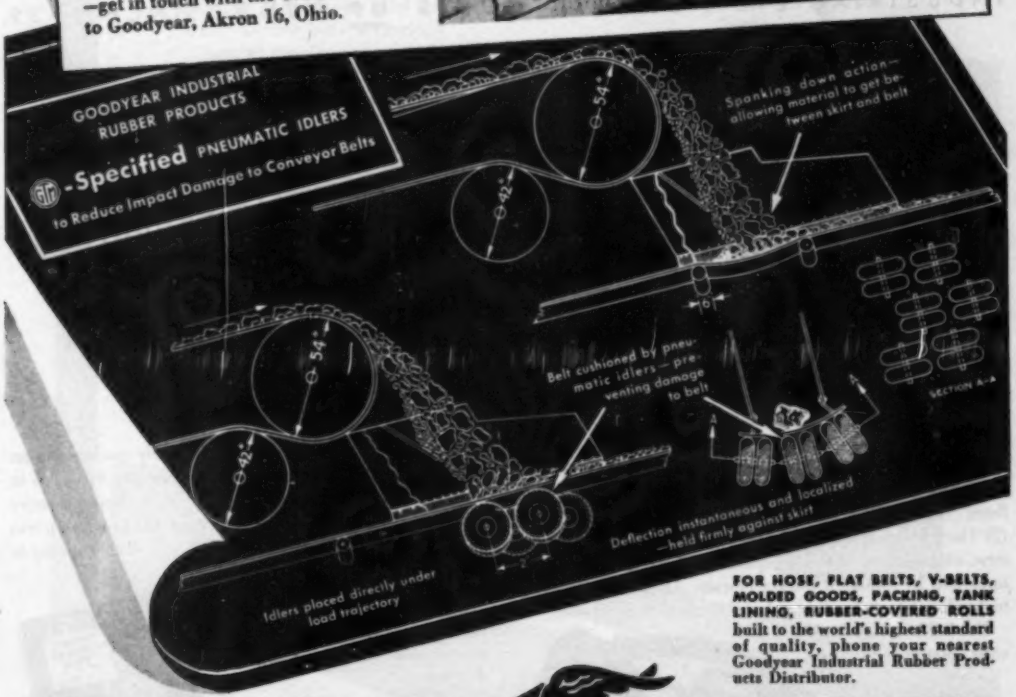
How the G.T.M. Increased Conveyor Belt Life 100%

PREVIOUS belt failed at less than 4,000,000 tons because of cuts and gouges caused by load impact.

The G.T.M.—Goodyear Technical Man—recommended installation of pneumatic idlers at impact point. RESULT: after carrying twice the tonnage, the belt has no cuts, no gouges and is still good for years' more service.

For help with your conveyor problems—old belts or new, long hauls or short—get in touch with the G.T.M. or write to Goodyear, Akron 16, Ohio.




GOODYEAR INDUSTRIAL RUBBER PRODUCTS
-Specified PNEUMATIC IDLERS
to Reduce Impact Damage to Conveyor Belts
54"
42"
Spanking down action—allowing material to get between skirt and belt
Belt cushioned by pneumatic idlers—preventing damage to belt
SECTION A-A
Deflection instantaneous and localized—held firmly against skirt
Idlers placed directly under load trajectory

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INDUSTRIAL EYE ACCIDENT **COSTS** **UP** 78½% SINCE 1939

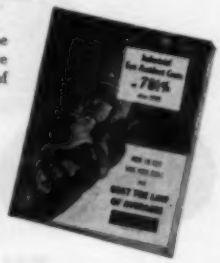
Production Goes Up... Operating Costs Go Down ..

when you eliminate High Eye Accident Costs from what you make and sell!

High eye accident costs can affect your operations adversely two ways: (1) They represent an unnecessary cost that inflates your selling price and hence cuts your volume. (2) They lower efficiency through increased unproductive time, idle machine charges, replacing key men with substitutes and by impaired worker morale. All this in addition to the direct costs for first aid and medical care.

Yet unlike other high costs that plague management today—*these can be cut.* How? By establishing an AO Eye Protection Program which can pay for itself in **less than six** months' time. Your MSA Representative can prove with case histories that an AO Program *works* — that goggles costing about $2.30 can save sums up to $44,000 annually! Ask him to call.

Ask your secretary to write for the FREE booklet on how to cut high eye accident costs and Beat the Law of Averages.



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SAFETY PRODUCTS DIVISION

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For a snug, tight fit...

BETHLEHEM *Mine Roof Ties*

One of the chief advantages of Bethlehem Mine Roof Ties is the snug, tight fit they make possible. A study of the pictures makes this immediately clear. The washer (plate or angle type as the case may be) is placed in a recessed hole so that it butts against the central rib of the tie. This minimizes slippage when the roof tie begins to take its load. Because of the tight fit and the virtual absence of movement, there's less sagging of the lower roof strata between the bolts. The safety feature here is obvious.

Bethlehem's most popular roof tie is the No. 5, which combines strength with a desirable amount of flexibility. This latter advantage enables the tie to follow closely the contours of the roof, which are often quite irregular. Hence sagging is further retarded.

One more point—Bethlehem tie installations permit the use of larger, stronger washers than are possible with conventional roof channels. As illustrated, the washers are available in three types so that roof bolts can be driven at three different angles (90, 60, and 45 degrees, measured from the horizontal).

Ask the nearest Bethlehem man for more details. He'll be glad to discuss roof ties and bolting with you at any time that suits your convenience.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

The three types of washers available for use with Bethlehem roof tie sets: plate for 90-degree assembly and angles for 60- and 45-degree assemblies, respectively.

Ties are held in place by Bethlehem roof bolts, driven into holes in the overburden. Upper end of each bolt is slotted to accommodate a wedge, this being forced deeper into the slot when the back of the hole is reached. Bolt-end expands, causing tight fit against sides of hole.

He's safe. In either open pit or underground mines, the Westinghouse Ground Fault Protector, mounted at lower left on the auxiliary transformer skid, prevents injury to men and damage to machinery.

Westinghouse

EQUIPMENT FOR
THE MINING INDUSTRY

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

DOES YOUR MINE HAVE ADEQUATE GROUND FAULT PROTECTION?

IT PREVENTS INJURY, SPOTLIGHTS TROUBLE

Unprotected ground faults are dangerous. They can gravely injure men who touch equipment served by a faulted feeder. They result from electrical troubles that can damage machinery and cause shutdowns. Ask yourself two questions: Are the high-voltage circuits that supply your shovels or draglines adequately protected? Are you overlooking the danger in *auxiliary* circuits that serve drills, pumps, etc.? If you're in doubt, your Westinghouse representative can be a big help.

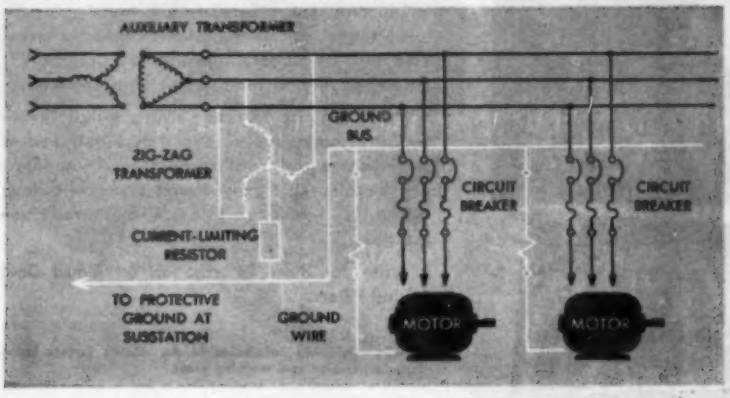
NOW—AUXILIARY CIRCUIT PROTECTION

Westinghouse has supplied high-voltage protective equipment for many years. Now, in answer to industry requests, Westinghouse offers a Ground Fault Protector for *auxiliary* circuits. This Protector is low in cost and easy to install. You bolt it to the auxiliary transformer skid and make simple electrical connections. When a fault occurs, the equipment served is immediately isolated. The trouble is then located, corrected and operation resumed. Men and machinery are safe.

HAVE WESTINGHOUSE CHECK YOUR SYSTEM

Call your Westinghouse office and have an engineer *make sure* your high-voltage protective system is adequate. Then have him tell you more about Westinghouse protection for auxiliary circuits. It's good business insurance. J-94850

HERE'S HOW THE AUXILIARY PROTECTOR PREVENTS INJURY



The frame of each of the motors, driving pumps, drills, etc., is connected to the ground wire (white line). If the current in the ground wire exceeds a predetermined safe amount, the circuit breakers serving the affected motors will trip. The faulted section is thus safely isolated and exposed as a trouble spot.

GET MORE INFORMATION NOW ON GROUND FAULT PROTECTION

Westinghouse Electric Corp.
P. O. Box 868
Pittsburgh 30, Pa.

Gentlemen:

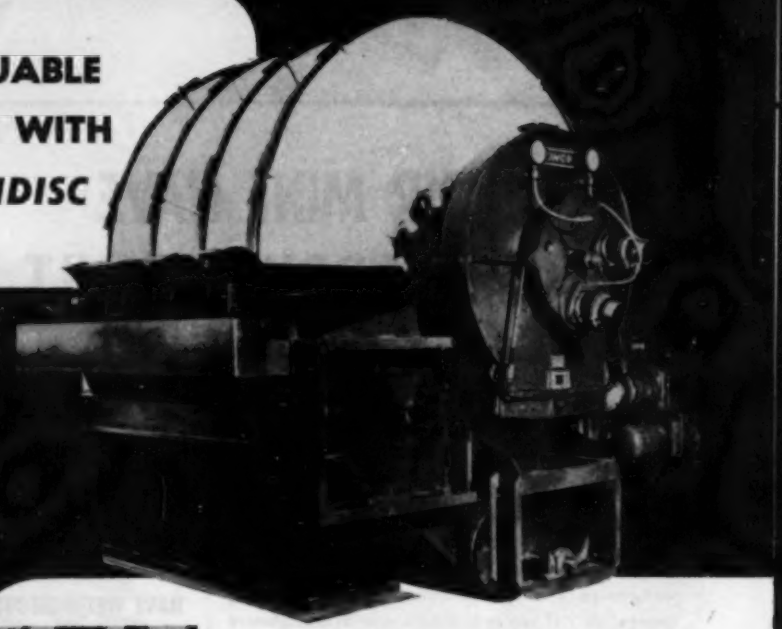
Please send me without obligation the following information:

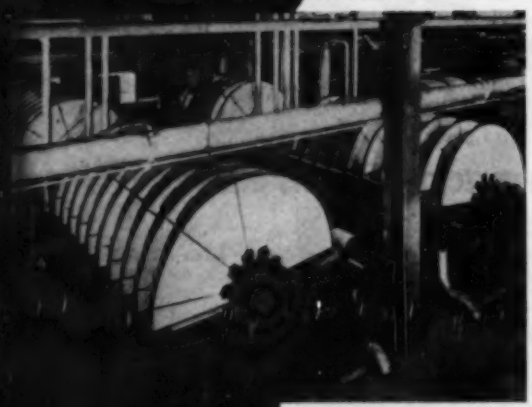
- ☐ Folder B-4747, Ground Fault Protection for Auxiliary Power Circuits in Open Pit Mines and Quarries.
- ☐ Booklet B-3282A, Electric Power Distribution and Protection for Open Pit Mines.

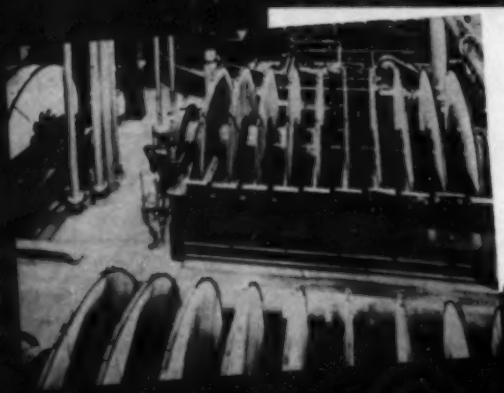
Name_____ Title_____

Address_____

SAVE VALUABLE COAL FINES WITH *EIMCO AGIDISC*







Modern coal washing plants are equipped with dewatering equipment to save coal fines and clarify the discharge water.

Older coal washing plants are finding that they can recover coal fines at a profit through the use of the same type of equipment.

Old and new plants using Eimco Agidisc filters have found that the salable coal fines recovered by this modern dewatering equipment is quickly paying for the expense of its installation.

Eimco Agidisc Filters are heavy-duty, high-capacity continuous vacuum filters designed to work on materials such as coal fines. These filters dry the cake rapidly and evenly and give a clean discharge. Maintenance is low and production is high.

Write for more information on Eimco Coal Saving Filters.

At Left: An Eimco installation in the world's largest heavy media separation coal washing plant.

A249

EIMCO

THE EIMCO CORPORATION

The World's Largest Manufacturers of Underground Rock Loading Machines

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THIS CATALOG *Tells All*

Here is a catalog that's different. You will want it for reference. It is written for mining people like yourselves and describes the many kinds of insulated wires and cables that are used in mining. The catalog tells about Borehole and Shaft Cables, Loading Machine Cables and Drill Cords, Telephone Cables, and Shovel Cables.

Besides the illustrations and descriptions of cables, the catalog gives information on splicing and on cable selection.

Want one? We will gladly send it. Simply fill in the coupon and return it to us.

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SIMPLEX WIRE & CABLE CO.

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NEW

Here are the SDR-34 Features that Revolutionize Shaft Sinking

Save You Time! *Save You Money!*

1. Air motor and jumbo screw mechanism for fast, easy adjustments. No slippage — good, positive set-up for complete drilling round.
2. Patented 2-to-1 air feed cylinder with chain drive. Positive feeding action for maximum drilling speed, minimum bit-wear. Six-foot changes eliminate steel handling for increased footage.
3. Model H23 Sinker. Weight 83 pounds. 3" bore provides plenty of rotation power and force of blow for fast drilling in all types of rock. Chucks for: 1" hex x 4¼", 1" or 1¼" round lug or popular quarter octagon sizes.
4. Line Oiler. Easy to fill, provides positive lubrication to the machines.
5. Drill Steel Centralizer. Opens and closes quickly. Makes hole collaring faster and safer.
6. Holes can be drilled at any angle. Adjustments are made quickly and easily by MDR air motors. You get better breakage for faster mucking.
7. Complete self-contained unit. Reduces handling time and effort. Speeds up shaft-sinking cycle for lower costs.

Specifications

LE ROI-CLEVELAND SDR-34 MULTIPLE DRILL SHAFT SINKER

Weight	1900 lbs.	DR34 air-shell steel change	6'
Width in closed position	5'6"	H23 chuck size — 1" hex x 4½ shank	
Length	16'	1" or 1¼" round lug, or	
DR34 air-shell travel	7'	popular quarter octagon sizes	

Can be furnished with 45 to 55 lb. Le Roi Cleveland H10 DR Drills—and for extremely hard rock conditions either the 3½-inch bore D-25 Driller or the 4-inch bore D-14 Driller.

Shaft Sinker

Drills 42-hole round in only 1/3 the time

required by two 55-lb sinker drills

Complete self-contained rig revolutionizes shaft sinking — speeds drilling — reduces steel handling — cuts costs!

HERE'S an example of how the new SDR-34 rig takes the headaches out of shaft sinking:

On a recent shaft job, the SDR-34 unit drilled out a 42-hole round (each hole 6 ft. deep) in less than an hour. On the same job it took two 55-lb. hand-held drills (3 steel changes) over three and a half hours to drill out this 42-hole round.

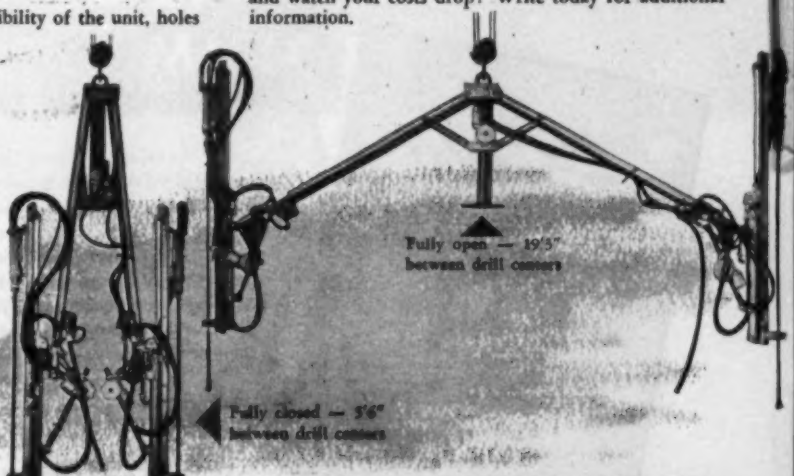
Obviously, savings such as this in drilling time do much to cut shaft sinking costs.

Moreover, because of the flexibility of the unit, holes can be drilled in the proper location and at the right angles to insure breakage for faster mucking. Again, you save!

Operators are less tired at the end of the shift, too. Using six-foot steels with tungsten carbide bits eliminates extra steel handling. And centrally located controls make the drill runner's job just that much easier.

Simplify your next shaft-sinking job with the SDR-34 and watch your costs drop! Write today for additional information.

The SDR-34 is a self-contained unit consisting of two famous Le Roi-Cleveland air-feed shells with two well known and popular Cleveland drills, air and water hoses, line oilers, drill-steel centralizers. Self-contained feature allows it to be dropped or withdrawn from shaft as a unit. Saves handling time. Gets round started faster for lower costs. MDR air motors make positioning fast, and easy — control arm-spread and drill angle through famous mine-jumbo screw mechanism.



LE ROI COMPANY

RD-29

CLEVELAND DIVISION • *Manufacturers of* CLEVELAND ROCK DRILLS

12500 Berea Road, Cleveland 11, Ohio

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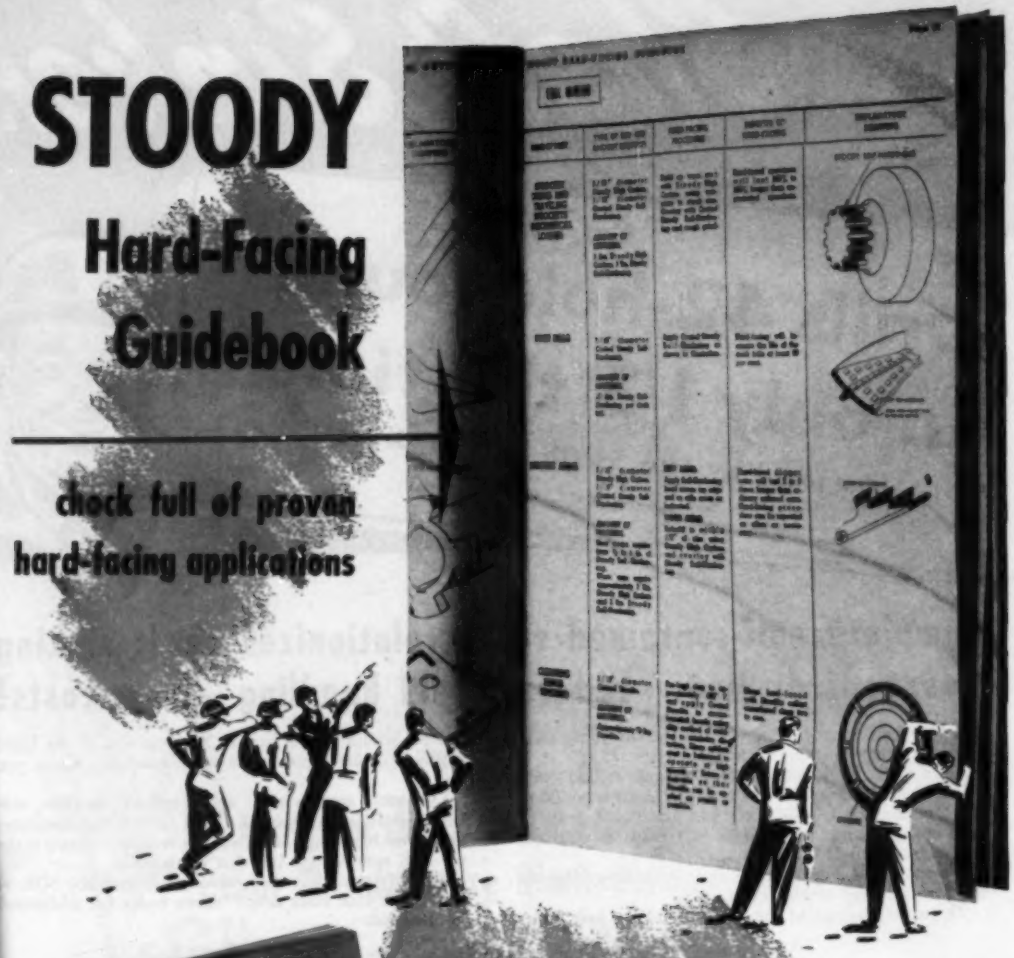
STOODY

Hard-Facing Guidebook

chock full of proven hard-facing applications



a valuable aid to maintenance men!

A lot of hard-facing success is in the use of correct alloys applied in the right way. If you want to eliminate failures, gain utmost life increase and savings in equipment dollars—get your copy of the STOODY HARD-FACING GUIDEBOOK!

Clear, concise descriptions of each hard-facing application provide the all-important know-how for common earth handling-crushing-mixing equipment in your industry. It costs you nothing—may provide the answers to more economical operation, fewer equipment breakdowns, more profit!

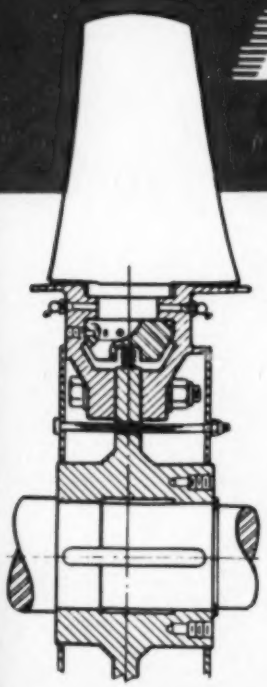
Simply ask for the "STOODY HARD-FACING GUIDEBOOK" on your letterhead; it will be mailed post-paid to your personal attention. *But it can't help you until it's in your hands—Write today!*

STOODY COMPANY

11943 East Slauson Avenue, Whittier, California

IT'S EASY

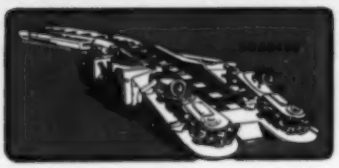
TO CHANGE BLADE POSITIONS ON THE JEFFREY AERODYNE MINE FAN

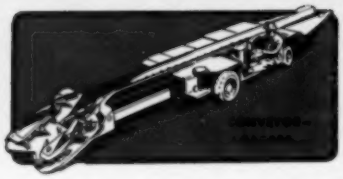


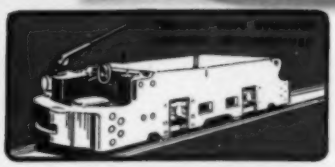
Easy blade adjustment is one of the important features of the Jeffrey AERODYNE Fan. The rotor is assembled with 12 blades designed for *individual* adjustment. Positive, accurate adjustment is made by removing one set screw in each blade, rotating the blade to desired position and re-inserting the set screw.

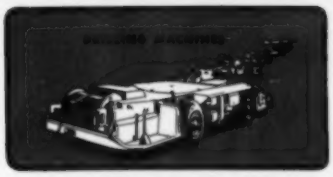
Ease of changing position is facilitated by providing stainless steel thread inserts in each screw hole of the socket, plus the use of rust-proof set screws. In addition, lubrication fittings are supplied on both halves of the socket to eliminate seizure between the blade and socket due to corrosion and dirt particles getting into space between blades and sockets. A large number of positions are available for an extremely wide range of operation.

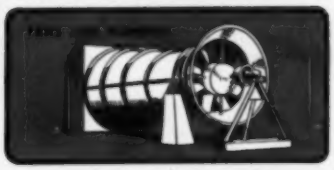
Consult a Jeffrey Engineer both on fan and blower applications for your mine.

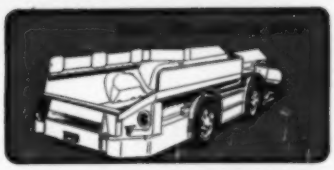


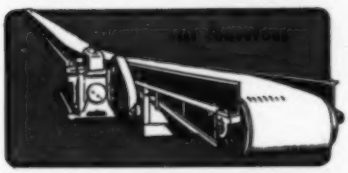


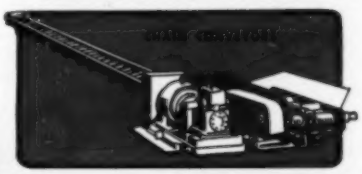












JEFFREY

EQUIPMENT FOR COAL MINES

THE JEFFREY MANUFACTURING COMPANY

Established 1877

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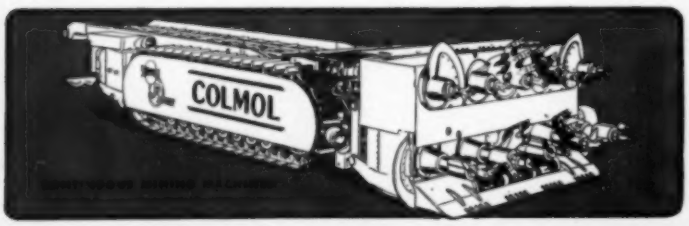


CLEAN COAL TAKEN OUT

without

REMOVING OVERBURDEN

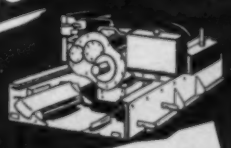
•

McCARTHY

COAL RECOVERY DRILLS

• McCarthy Coal Recovery Drill shown with 36-inch auger, Lump Drill Head, Auger Retriever and Auger Hoist.

Rugged



Powerful

• Compactly designed McCarthy Underground Coal Recovery Drill equipped with permissible electric motor.

• Use McCarthy Coal Recovery Drills and you can mine, load and ship coal all in one continuous operation without considering cost of removing overburden!

● Here's a combination drill and screw conveyor unit that pulls continuous streams of clean coal right out from the heart of the vein without removing overburden!

McCarthy Coal Recovery Drills are built for both strip and deep mine operations. They work easily to horizontal depths 60 feet deep or more to deliver an average daily output amounting from 15 to 50 tons per man per shift.

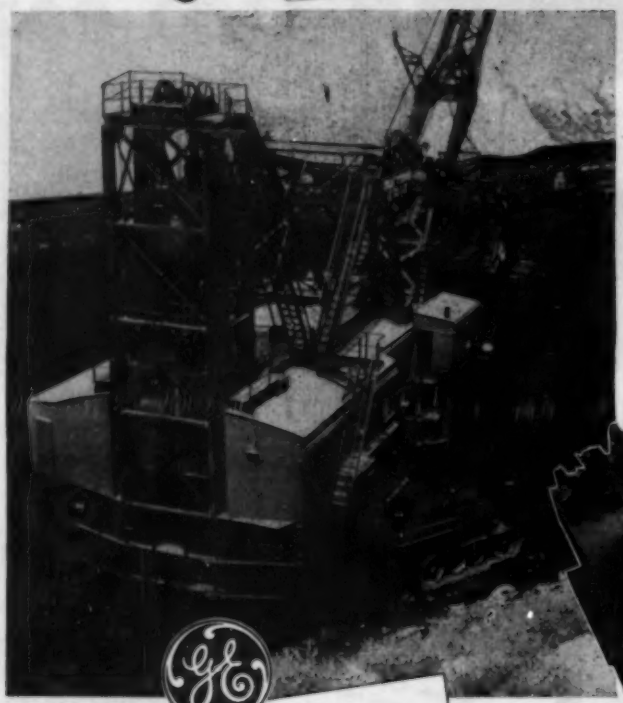
McCarthy Coal Recovery Drills are ruggedly built, equipped with finger-tip hydraulic controls and gasoline, electric or diesel power units.

Special gear ratios provide for a smooth, steady bite with six or twelve-foot interlocking Salem auger sections of 12, 16, 20, 24, 30, 36, 42 and 48-inch diameters.

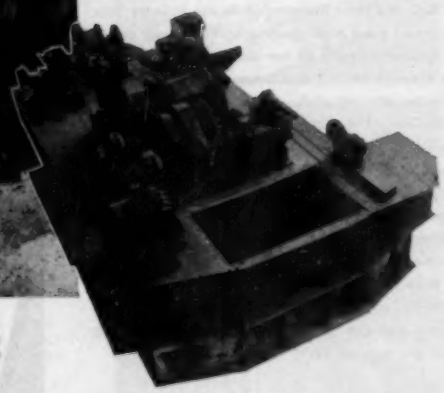
Write today for the full story on the revolutionary new McCarthy Coal Recovery Drill . . . a tool that day in and day out, delivers 15 to 50 tons of clean coal per man per shift!

SALEM

Loads 30 tons a minute —electrically!



1 With a 17-yard dipper and an 85-foot boom length, this new loader needs only five passes, averaging 35 seconds each, to load a standard 75-ton coal car! Thanks to G-E amplidyne control of hoist, swing, and crowd motions, the operator gets instant-acting response from the huge shovel, plus fast acceleration and deceleration that cuts cycle time to a minimum. With main drive completely G-E equipped, this world's largest coal loader contains motors totalling some 2000 horsepower.



AMPLIDYNE-CONTROLLED

SHOVEL DRIVES

. . . to cut mining costs!

2 Muscle power for the loader—shown in this view of machinery deck during assembly—includes two 187½-hp hoist motors (foreground), two 75-hp vertical swing motors, and a 75-hp crowd motor (background). G-E MD series motors—the toughest G-E shovel motors ever built—permit handling heavier loads safely at higher maximum speeds, provide more hp per frame size, require less inspection and maintenance.

3 This mammoth strip shovel—the loader's teammate and also electrically equipped throughout by General Electric—can pick up a load of overburden with its 20-yard dipper and drop it 300 feet away! In addition to amplidyne control of all motions, it utilizes a G-E amplidyne power-factor regulator that substantially reduces voltage variation, permits more efficient operation of the equipment.

World's largest loading shovel—together with giant stripper—relies on G-E equipment to help maintain average output of 100 tons of coal per man per day at Foley Bros. Inc. operation near Colstrip, Montana!

4 Hoist, swing, and crowd motors in the stripper are precisely governed by its G-E amplidyne control, shown mounted atop G-E motor-control cabinet inside the shovel house, with G-E switchgear at left. Small and compact, it uses fewer control devices, takes up minimum space, protects equipment against excessive current and torque peaks.

5 Incoming a-c power, protected against outages by neutral grounding, is converted to d-c by this 7-unit motor-generator set. Neutral grounding assures maximum protection for operating personnel and minimum equipment shut-downs in case of any line-to-ground fault. On large shovels of this type, designed to pay off by continuity of operation and high output, this is an especially important factor.

6 These two G-E 250-hp hoist motors, as well as the stripper's other motors, are of extra-tough construction for extra-heavy duty. They feature removable top portion for easy inspection and maintenance—right on the shovel—without disturbing motor alignment. Removal of external connections and four bolts provides easy access to armature and brush holders.

7 Like the stripper's hoist and crowd motors this G-E 125-hp vertical swing motor, one of two, is built for extra-tough jobs. Literally thousands of shovels and draglines have been electrified by G. E. to boost output, cut costs. This experience is at your service when you call in a G-E mining specialist, or specify G-E shovel equipment. Send for Bulletin GEA-4843, "More Yards Per Day." *Apparatus Department, General Electric Company, Schenectady 5, New York.*

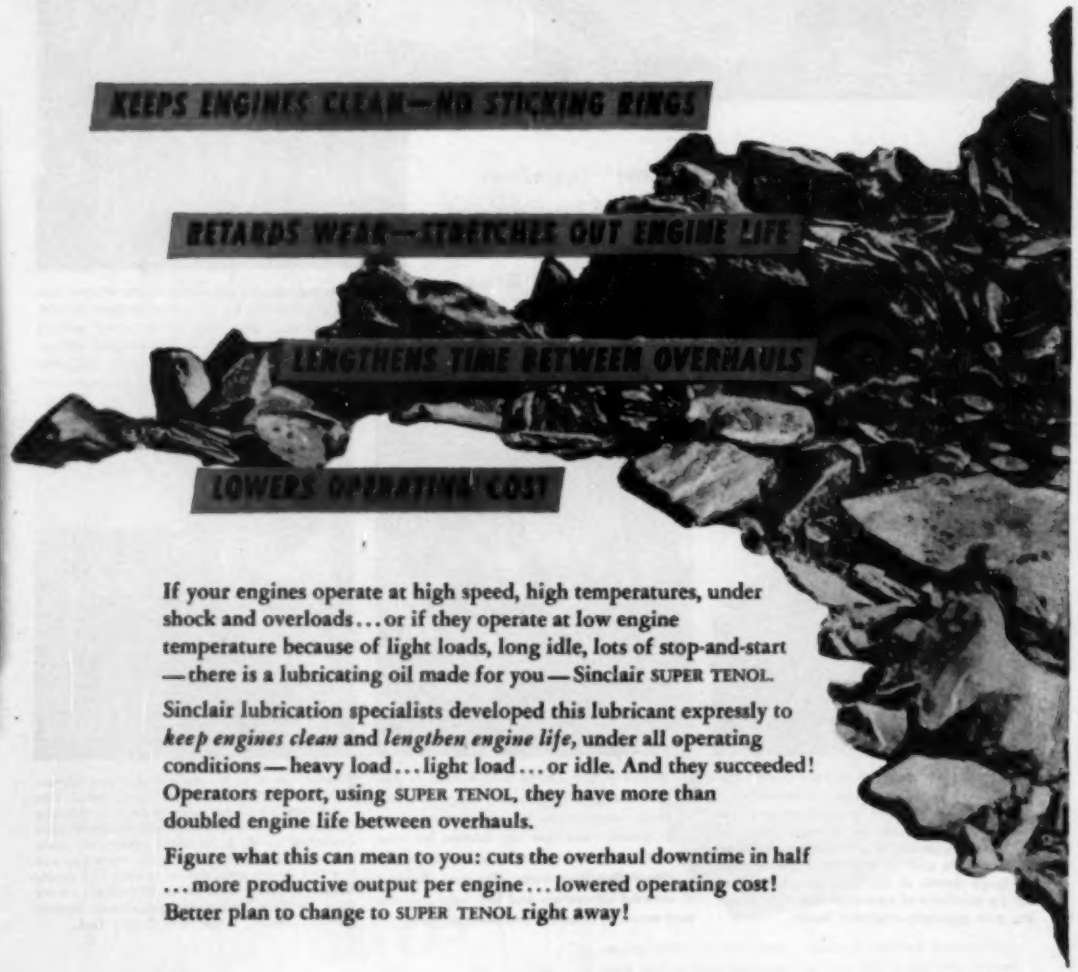
GENERAL ELECTRIC

660-51

on TOUGH jobs, this SUPER oil can

DOUBLE

BETWEEN OVERHAULS


KEEPS ENGINES CLEAN—NO STICKING RINGS
RETARDS WEAR—STRETCHES OUT ENGINE LIFE
LENGTHENS TIME BETWEEN OVERHAULS
LOWERS OPERATING COST

If your engines operate at high speed, high temperatures, under shock and overloads... or if they operate at low engine temperature because of light loads, long idle, lots of stop-and-start —there is a lubricating oil made for you—Sinclair SUPER TENOL.

Sinclair lubrication specialists developed this lubricant expressly to *keep engines clean* and *lengthen engine life*, under all operating conditions—heavy load... light load... or idle. And they succeeded! Operators report, using SUPER TENOL, they have more than doubled engine life between overhauls.

Figure what this can mean to you: cuts the overhaul downtime in half ... more productive output per engine... lowered operating cost! Better plan to change to SUPER TENOL right away!

For lubrication help, see your local Supplier of Sinclair Products or write to Sinclair Refining Company, 630 Fifth Avenue, New York 20, N. Y.

ENGINE LIFE

Depend on "VENTUBE"

NOT HARMED BY FUNGUS GROWTHS...

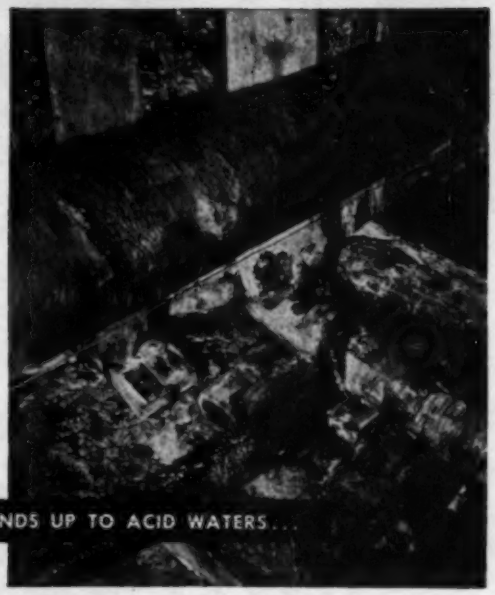
Among the many advantages of a Du Pont "Ventube"* auxiliary ventilation system are long life and trouble-free operation, which keep costs down and production up.

"Ventube" is triple-treated against fungus growths. First, the thread is treated. Then the fabric. And finally the coating is treated.

"Ventube" also gives maximum protection against the corrosive effects of acid mine waters (and alkali waters, too). Even if the tubing should be corroded where mine conditions are worst, "Ventube" is easy to repair. The bad spot in the tubing can be cut out and a new section coupled into place.

You can *depend* on "Ventube" (attached to a permissible blower fan) to do a good job for you . . . bringing fresh, cool air to men at the face . . . reducing down-time after blasting . . . speeding your production. Lightweight and long-lasting. Easy to install, to move, to store. Low in both original and upkeep cost.

For further details, consult Du Pont technical service, Fabrics Division, E. I. du Pont de Nemours & Co. (Inc.), Empire State Building, New York 1, N. Y.



STANDS UP TO ACID WATERS...

*"VENTUBE" *is Du Pont's registered trade mark for its flexible, synthetic-rubberized ventilating duct.*

DU PONT "VENTUBE"
DU PONT
FOR LOWER PRODUCTION COSTS THROUGH BETTER VENTILATION
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

WIRE ROPE

Roebling rope is the A-1 specification in the mining fields

FOR EASY HANDLING, extra toughness and service life, there's nothing like Roebling Preformed "Blue Center" Steel Wire Rope. "Blue Center" steel—made only by Roebling—gives rope top resistance to abrasion and fatigue. And Roebling Preforming gives you a rope that spools better... doesn't tend to set or kink... minimizes vibration and whipping.

There is a Roebling wire rope of the right construction, grade and size for every type and make of rope-rigged equipment. Have your Roebling Field Man help choose the rope that will give you the best, low-cost performance. Further savings may be effected by following his suggestions on installation, use and maintenance of wire rope. John A. Roebling's Sons Company, Trenton 2, N. J.

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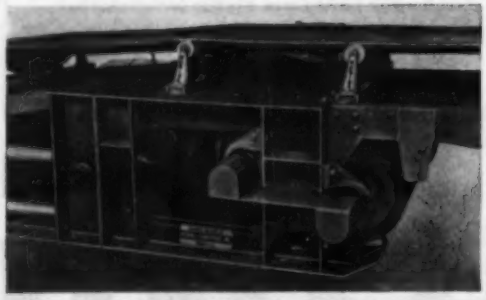
ROOM...GRANDMOTHER...OR SLOPE

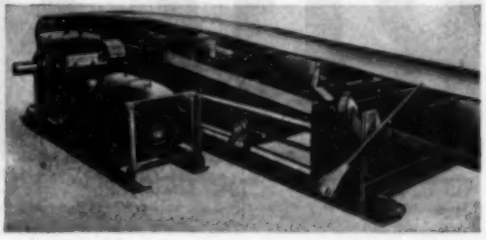


SINGLE OR TANDEM DRIVE

Hewitt-Robins Mine Conveyors come equipped with both single and tandem pulley drive elements. Provide ample horsepower for lift and length up to the very limits of belt capacity. Reeving of belt handles level, uphill or downhill service requirements.

UNIFIED DRIVE SECTION

Motor, reducer and controls mounted on a single base—skid-designed for easy moving about. Can be located on either side of the conveyor. Drive reversible—incoming for men and material, outgoing for high output of product.



there's a Hewitt-Robins Mine Conveyor to meet your specific requirements

Solve your underground conveying problems the easy, economical way. With a choice of THREE types of Hewitt-Robins Mine Conveyors, you are sure to get exactly the equipment you want.

TYPE I has *internal* drive for level or *up*hill operation; in 26", 30", 36" and 42" widths—lengths to 3000 feet or more.

TYPE IS has *internal* drive for level or *down*hill operation; in 26" and 30" widths—lengths to 3000 feet or more.

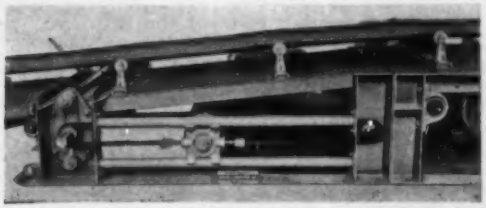
TYPE H has *head* drive for level or *up*hill operation; in 26" and 30" widths—lengths to 2000 feet.

Intermediate Sections are standard, fit all three types. Assembly is easy—both ends are identical, need no "matching up." Made in 8' and 10' rigid and demountable sections. Also available are Intermediate Channel Sections in 12' lengths—30", 36" and 42" widths.

Only Hewitt-Robins can offer you a complete mine conveyor "package"—machinery *plus* belt, motor, reducer and drive! You can order equipment to fit your needs to a "T"—single or tandem pulley drive . . . internal or tail takeup . . . the famous Ajax® heavy-duty belt, in the required length and width.

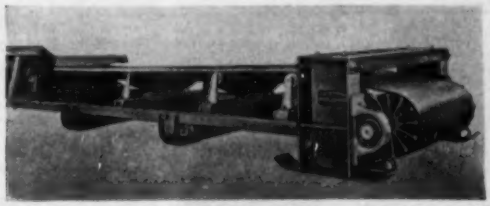
The sturdy machinery is built for the toughest kind of service. You get ball or roller bearing, one-shot lubrication idlers . . . lagged pulleys for maximum power transmission . . . a conveyor backed by over half a century of engineering and manufacturing experience. And, only Hewitt-Robins leaves you worry-free—takes complete *unified* responsibility for successful performance of machinery *and belt!*

Make sure you get the best for your money. Write for detailed specifications. Address: Hewitt-Robins Incorporated, 1010 Pennsylvania Ave., Charleston, W. Va., or 270 Passaic Ave., Passaic, N. J.



INTERNAL TAKEUP

Located directly back of the drive. Handles 10' of belt slack. Operated by reversible ratchet-wrench working on gear reduction to minimize manual effort. Arranged so an automatic counterweighted gravity take-up can be added if desired—eliminating manual adjustment. Double-acting pawl prevents back up.



TAIL SECTION

Telescopic type to provide tail takeup action. Easy to clean out—no steel work under tail pulley. Has transverse cover to protect pulley, bearings and belt. Strong enough so that you can rest a feeder on it.

NEW 2¼" TROUGHING IDLER has *roller* bearings. Demountable, easy to assemble under the belt. Triple grease seal locks grease in, keeps dirt and moisture out.

HEWITT-ROBINS
MINE CONVEYORS

Hewitt-Robins is participating in the management and financing of Kentucky Synthetic Rubber Corporation.

HEWITT-ROBINS HR **INCORPORATED**

BELT CONVEYORS *(belting and machinery)* • BELT AND BUCKET ELEVATORS • CAR SHAKEOUTS • DEWATERIZERS • FEEDERS • FOAM RUBBER PRODUCTS • FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS • RUBBERLOKT ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS • TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS

Cut tool cost per ton

CARBOLOY®
CEMENTED CARBIDE

Actual field tests prove Carboloy tools deliver lower over-all cost per ton

MAKE MINING cost per ton your yardstick and you'll join the many mining companies that are standardizing on uniform high quality Carboloy Coal Mining Tools.

Carboloy tools assure you of unequalled performance because Carboloy Company—*and only Carboloy*—backs every tool with 29 rigid quality tests. And here are three other exclusive features that spell quality in every Carboloy tool:

1 ***Carboloy's program of continuous grade improvement***—rather than changing grades for special purposes.

2 ***Carboloy's program of engineering and research***—the nation's largest and most complete facilities devoted to carbides.

3 ***Carboloy's unexcelled production facilities***—the finest in the world for mass production of cemented carbide tools.

Yes, you can cut over-all cost per ton with the uniform high quality Carboloy Coal Mining Tools shown on these pages. See your nearest Authorized Carboloy Distributor listed below or write Carboloy Company, Inc., direct.

Improved Carboloy

ROOF BOLTING DRILL—

For faster, easier drilling in hard slate, shale, and laminated limestone.

Tipped with Carboloy cemented carbide—the hardest metal made by man—to give maximum speed in medium roof drilling. Develops faster drilling speed than pneumatic methods. Improved flute design to remove cuttings faster; alloy steel body for greater strength.

ALABAMA, Birmingham 2
Young & Vann Supply Co.

COLORADO, Denver 17
Mine & Smelter Supply Co.

ILLINOIS, Christopher
E & E Mine Service Co.

INDIANA, Jasper
Jasper Machine Works

KENTUCKY, Harlan
General Electric Supply Co.
Kentucky Mine Supply Co.

OHIO, Cambridge
Cambridge Machine & Supply Co.

PENNSYLVANIA, Indiana
Whiteman Division
National Mine Service Co.

PENNSYLVANIA, Washington
Fairmont Supply Co.

TENNESSEE, Knoxville
W. J. Savage Co.

UTAH, Salt Lake City 11
Mine & Smelter Supply Co.

VIRGINIA, McClure
Erwin Supply & Hdw. Co.

WEST VIRGINIA, Bluefield
Bluefield Supply Co.

WEST VIRGINIA, Fairmont
Fairmont Supply Co.

WEST VIRGINIA, Montgomery
Marathon Coal Bit Co.

CARBOLOY COMPANY, INC.
11120 E. 8 Mile Ave. Detroit 32, Michigan

For LOWER TOOL COST per ton

with uniform high quality coal mining tools

GET GREATER MINING ECONOMY WITH THESE PROVEN CARBOLOY TOOLS

Carboloy's Improved

AUGER DRILL BIT

—for faster, easier drilling

Ideal for post, mounted, and push drilled.

Check these quality features:

- ★ Maximum clearance and relief angles permit freer, faster cutting.
- ★ Improved spiral prevents packing of coal cuttings.
- ★ Uniform high-quality carbide throughout entire tip. Assures longer bit life.
- ★ Long tips of Carboloy cemented carbide permit many more regrinds.

PLUS

- ★ Forged alloy steel shank.

Carboloy's Improved

FINGER BIT

—for strip, underground mining

Perfect for use in hard-to-take-hold-of medium ground!

Real gouging action; fits all standard auger drill heads using 1" bits. Other plus features:

- ★ Faster cutting due to larger clearance angle on shank.
- ★ Drills more freely.
- ★ Less pressure required.
- ★ Uniform high quality throughout entire tip.

PLUS

- ★ Steel shank—heat-treated.

Carboloy's

MINING MACHINE BIT

—with 8 important advantages

- ★ Shank level with insert for free flow of coal.
- ★ Less shank steel to grind, yet adequate insert support.
- ★ Less carbide to grind, faster grinding, greater tip economy.
- ★ Smaller point for less power consumption.
- ★ No shoulders; set to any gauge size within range of uses.
- ★ Maximum hold through combination of braze and mechanical holding.
- ★ Approximately 50% greater thickness of insert at cutting edge.

PLUS

- ★ Steel shank heat-treated to resist bending; permits set screw clamping.

® The registered trade-mark "Carboloy" denotes manufacture by Carboloy Company, Inc.

Specify **CARBOLOY**

THE QUALITY BRAND OF COAL MINING TOOLS

ANY coal screen need can be met with these three screens

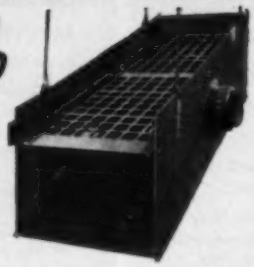
Low-Head Screen

USED FOR:

- Primary dewatering of coarse coal following washers.
- Primary and secondary dewatering of small coal.
- Sludge dewatering.
- Desliming ahead of centrifugal dryers.
- Pre-wetting ahead of Heavy-Media Separators.
- Draining and washing media from coal and refuse following Heavy-Media Separators.
- Dewatering washer refuse.
- Dewatering and sizing middlings.
- Water clarification and recovery of salable sludge.

Low-Head vibrating screens operate horizontally — save headroom and installation costs. Straight-line vibrating motion at 45° to the horizontal results in a definite conveying action and rapid stratification. Sizes 3 x 6 to 6 x 16 ft. Send for Bulletin 07B6330A.

Ripl-Flo Screen

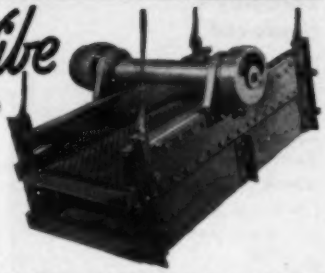


USED FOR:

- Scalping ROM ahead of picking tables or crushers. (Extra Heavy Duty *Ripl-Flo* screen)
- Sizing raw coal ahead of washers or dry cleaners.
- Sizing and re-screening crushed coal into egg, range, nut and stoker grades, with 2, 3 or 4 separations.
- Primary dewatering of coarse coal following washers.
- Dewatering washer refuse.
- Dewatering and sizing middlings.
- Dry screening medium size moist coal. (Sta-Kleen deck)
- Dry screening small size moist coal. ("Tri-Slope" Sta-Kleen deck)

Ripl-Flo vibrating screens are built with only two bearings instead of four. Width is reduced 17%; weight by as much as 36% — low maintenance and power costs. Convenient clamping plates make it easy to change or tension screen cloth. Sizes 3 x 6 to 6 x 16 ft. Bulletin 07B6151B.

Aero-Vibe Screen



USED FOR:

- Sizing raw coal ahead of air cleaner.
- Dedusting.
- Dewatering sludge.
- Sizing middlings from dry cleaner.
- Dewatering coal following chloride washer.

Aero-Vibe screens, for fine to medium sizing, wet or dry, are easy to install and operate, require little maintenance. Amplitude of vibration can be changed by adjusting outer counterweights on each side of two-bearing concentric shaft. Sizes 2 x 4 to 5 x 10 ft. Bulletin 07B6099.

Your nearby A-C representative will be glad to show you how these coal screens can save money in your plant. Allis-Chalmers, Milwaukee 1, Wis.

ALLIS-CHALMERS

A-3385

Texrope, Low-Head, Ripl-Flo, Aero-Vibe and Sta-Kleen are Allis-Chalmers trademarks.

Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.

Motors | Controls | Texrope Drives | Vibrating Screens | Jaw Crushers | Kilns, Coolers, Dryers

HEAVIER LOADING is possible on conveyor belts built with "Cordura" Rayon. This yarn is stronger than natural fibers commonly used. It packs extra strength into conveyor belts and enables them to carry loads to the capacity of power equipment.

WHY YOUR NEXT CONVEYOR BELT SHOULD BE BUILT ON DU PONT "CORDURA" RAYON

The next time you need a conveyor belt, ask your supplier about the remarkable performance of belts built on Du Pont Cordura* High Tenacity Rayon. This industrial rayon provides far greater strength than natural fibers commonly used, and makes a thinner, more workable belt, *at no extra cost.*

This yarn, which puts toughness in heavy-duty truck tires and makes thinner, stronger hoses, can also make more efficient conveyor belts for your mine.

We'll be glad to furnish the names of suppliers of belts made with "Cordura." You can get full information about "Cordura" in the new manual, "Sinews for Industry." It gives physical properties of "Cordura" rayon, describes many successful applications and tells how "Cordura" improves the efficiency of conveyor systems. For your free copy, address Room 4527, Rayon Division, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

*Reg. U. S. Pat. Off.

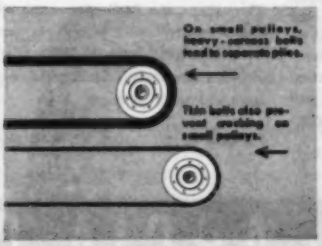
DU PONT "CORDURA" HIGH TENACITY RAYON

DU PONT

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

for RAYON . . . for NYLON . . . for fibers to come look to DU PONT

GREATER STRENGTH of belts built with "Cordura" is illustrated above. At left is cross-section of four-ply belt sinewed with "Cordura." It's stronger than conventional 6-ply belt at right, yet only half as thick. This thin, light belt is particularly desirable where panel equipment is moved frequently.



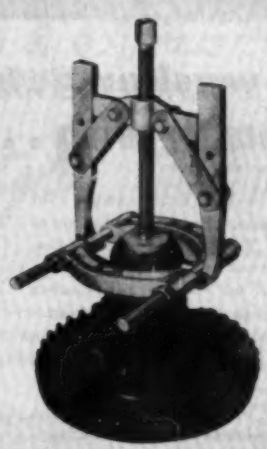
MORE FLEXIBLE. Belts built with "Cordura" have less tendency to crack and separate plies when run over small pulleys required in confined working space. And belts built with "Cordura" have less stretch, so less take-up room is needed. And they trough well under any loading conditions.

LONGER LIFTS. The high tensile strength of "Cordura" Rayon eliminates costly transfer points. For example, a belt reinforced with seven plies of "Cordura" can lift 1000 pounds of overburden per hour up a 15° slope over 1000 foot centers. It has design tension of 900 pounds per inch of width.

OTC

Economical Maintenance Is Your Only Insurance When Your Profit Potential Depends On Any Machine With Moving Parts. We Will Deliver OTC, The Finest Bearing Service Tools, As Quickly As Is Humanly Possible When A Machine Has Gone Out of Production. But Why Wait! The Time To Prepare For Normal Wear Is Now!

Save Time And Money, Stock OTC Tools NOW!



OTC *Pullers remove* Bearings *with ease*

Removing bearings by punch and chisel is definitely poor business. Bearings must be removed and replaced with extreme care if they are to operate properly. The OTC Puller shown will do the job quickly with no danger of harming the bearing.

▶ A CATALOG OF ALL OTC TOOLS IS AVAILABLE—ASK FOR IT!

WEST VIRGINIA BEARINGS, INC.
1516 Kanawha Blvd., West • CHARLESTON 2, W. VA.

PENNSYLVANIA BEARINGS, INC.
5536 Baum Blvd. • PITTSBURGH 32, PA.

INDIANA BEARINGS, INC.
801 N. Capitol Avenue • INDIANAPOLIS 4, IND.

TENNESSEE BEARINGS, INC.
417 Dale Avenue • KNOXVILLE, TENNESSEE

Another Job where they're saving TIME and MONEY

...with JOY SULMET BITS

PLACE AND CONDITIONS—The seam varies from 4½′ to 7′ in thickness at this property. It is characterized by a hard slate band, 4″ thick, approximately midway from floor to roof.

FORMER METHOD—Full seam mining was employed, the coal being undercut by a Joy 11-RU Universal Cutter. Excessive bit costs with their former bits made a shear cut impractical. The entire fall was loaded out and the slate picked out at the tipple.

PRESENT METHOD—The mine switched to Joy Sulmet SF Cutter Bits. The horizontal cut is now made in the slate band. A shear cut is made along the rib.

RESULTS—Hand-picking at the tipple has been eliminated, since the entire slate band is cut out and gobbed before the face is shot.

Powder costs are lower since a heavier charge was required to break the slate band.

Size consist has improved due to the lighter powder-charge required.

Cutting speed has increased, since bit-change time has been reduced considerably.

These cost improvements are entirely due to the ability of Joy Sulmet Cutter Bits to cut hard impurities more easily than ordinary bits can cut coal.

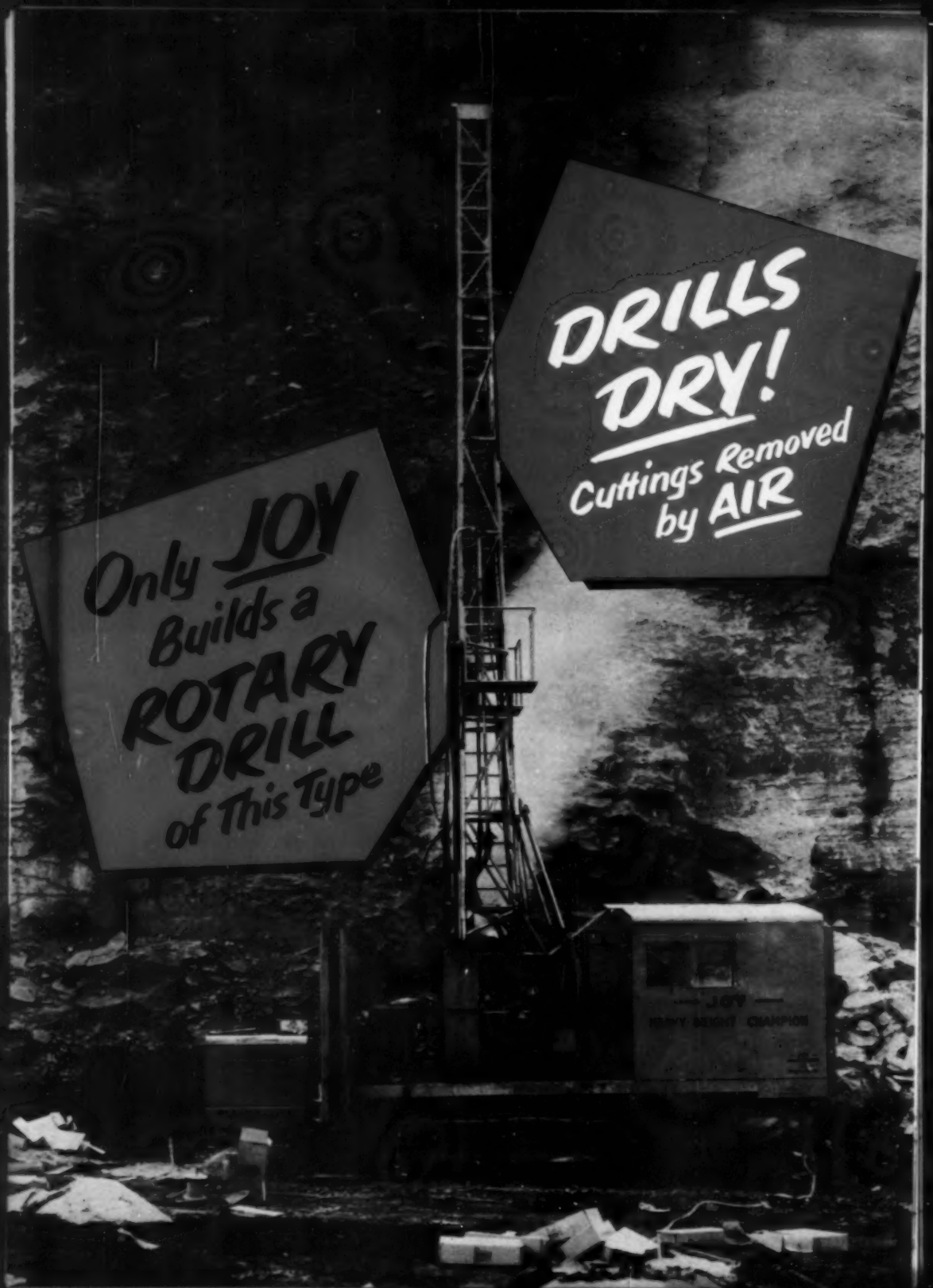
Consult a Joy Engineer

9D CL 9461

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO


DRILLS DRY!
Cuttings Removed by AIR
Only JOY Builds a ROTARY DRILL of This Type
— JOY —

COAL STRIPPING OPERATORS:

THE JOY CHAMPION BLAST-HOLE DRILL

GIVES YOU MANY EXCLUSIVE BENEFITS

★ MUCH FASTER DRILLING SPEED
★ MUCH LONGER BIT LIFE
★ MUCH LOWER DRILLING COSTS

Here's masterful drilling performance for you! The JOY Heavyweight Champion Blast-Hole Drill illustrated at left not only replaced three churn drills on a stripping operation, but produces two-thirds more footage per day than all three churn drills combined. Bit life is about 8000 feet of drilling, and bit cost is approximately 1½ cents per foot.

The JOY Champion is the only drill of its type in the field . . . a continuous-type rotary drill that drills *dry*—using a tri-cone, roller-type bit to pressure-cut the rock, and a compressed-air blast to remove cuttings and cool the bit.

There are no water lines to lay, no winter-freezing or cold-weather lay offs. Instantaneous removal of cuttings keeps the bit constantly working on bare rock for maximum drilling speed. Rigid drilling stem, plus hydraulic control of feed pressure and rotation speed, prevents bit "wander"—insures finishing every hole you start—gives you perfectly straight, smooth-walled holes that are easier and safer to load and assure topmost blasting efficiency.

Additional features: the JOY Champion is self-propelled on crawler treads, trams at speeds up to 5 mph. Drills vertical holes from 5⅝" to 7⅞" diameter, to any normal depth. Sets up quickly, with 3-point hydraulic leveling. Available in two models, the Mediumweight or Heavyweight, with either electric motor or diesel engine drive.

WRITE FOR BULLETIN D-36

Consult a Joy Engineer

W&D CL 3460

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

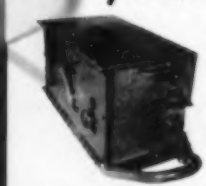
IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

Just like taking out insurance on men, machines and cable

Mines "SPB" Connector with intrinsically-safe control circuit, for gaseous mines.

JOY SAFETY CIRCUIT CENTERS and "SPB" BIGUN CONNECTORS

Complete Line Available

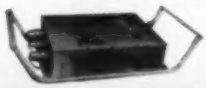


All SCC units are equipped with "Mines" Connectors—moisture, oil and wear-resistant—available in a complete range of sizes and types.

Above: Full Height SCC with Dust-Resistant Housing. The Permissible unit for high coal is shown in use, top of page.

Above: Low Height SCC with Permissible Housing, for thin-seam gaseous mines. Single and multiple-outlet types.

Right: Low Height SCC with Dust-Resistant Housing, for entries and non-gaseous operations in thin seams.



Here is *packaged* wiring—"Mines"-built Safety Circuit Centers used with "Mines" Electrical Connectors for individual power take-offs—by far the best and most efficient power distribution system for modern mining machinery. These SCC units not only give you maximum protective value, but maximum productive machine time as well . . . and they're fool-proof, trouble-free, and completely portable. Built in low or high coal models, with permissible or dust-resistant housings, in sizes and current ratings to match any mining requirement. ● *Let us show you how "Mines" SCC units and Connectors can give you another boost on the road to greater production and lower costs!*

W&D ME 3042

Consult a Joy Engineer

for complete details and prices

MINES EQUIPMENT — MINES — *Division*

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

Permissibles

THAT GIVE THE MOST FOR YOUR DYNAMITE DOLLAR

One of the permissibles on the Hercules list will shoot your coal the way you want it, and make every dollar you spend for explosives go further. Let Hercules help you to select the permissibles best suited to *your* coal and working conditions.

HERCULES POWDER COMPANY 936 King Street, Wilmington, Delaware XR50-9

DESIGNED FOR STRIP MINING
MANITOWOC
4500
REACH....
More and more of the leading strip operators and contractors are switching to the big, powerful Manitowoc 4500. It's the real sensation of the mining industry . . . sensational in design and performance. As a shovel, it ranges from 4 yds. on a 60′ boom, 5 yds. on a 50′ boom, 5½ yds. on a 40′ boom. As a dragline, it ranges up to a 140′ boom. And there's power-a-plenty in its rugged 375 H.P. Diesel.
STABILITY...POWER
It's packed with extra features . . . fewer gears, all enclosed running in oil; high speed shafts on ball or roller bearings; simple, independent cable crowd; single, tubular stick rolls through saddle but is free to turn. Ships on standard flat cars with minimum dismantling. Unload and erect in 3 to 5 days.
MANITOWOC
SHOVELS
1-5 YD.
MANITOWOC
Speedcrane
CRANES
18-100 TON
WISCONSIN

Bagdad Copper Corporation's Arizona plant chose Gates Vulco Rope Drives for these big Ball Mills because of the proven ability of Gates Vulco-Ropes to handle this rugged service.

This Simple Test Tells WHY the Concave Sides of Gates Vulco Ropes Mean *Longer Belt Life!*

Prove this *yourself*—in two minutes' time.

Take any V-belt that has *straight* sides. *Bend* that V-belt while you grip its sides between your fingers and your thumb. You will *feel* the sides of the belt *bulge out*—as shown in figure 1-A, below.

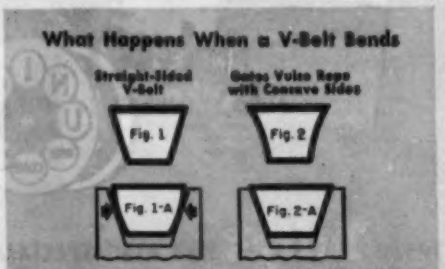
Clearly, that outbulge forces the sides of the belt to press *unevenly* against the V-pulley—and this concentrates the *wear* where the bulge is greatest.

Now, make the same test with the belt that is built with the Concave Sides—the Gates Vulco Rope.

Figures 2 and 2-A show clearly what happens when you bend a Vulco Rope. Instead of *bulging*, the precisely engineered Concave Sides merely *fill out* and become perfectly straight. There is no side-bulge. This belt, when bent, precisely fits its sheave groove.

Because there is *no bulging*, the sides of the Gates Vulco Rope always grip the *full* face of the V-pulley *evenly* and therefore wear *uniformly*—resulting in *longer belt life* and *lower belt costs for you.*

Only V-belts made by Gates are built with concave sides. Whenever you buy V-belts, be sure that you get the V-belt with the Concave Sides—The Gates Vulco Rope!


What Happens When a V-Belt Bends
Straight-Sided V-Belt
Gates Vulco Rope with Concave Sides
Fig. 1
Fig. 2
Fig. 1-A
Fig. 2-A
How Straight-Sided V-Belt Bulges in Sheave-Groove, Sides Press Unevenly Against V-Pulley Causing Extra Wear At Point Shown by Arrows.
The Concave Sides Fill Out to a Precise Fit in the Sheave-Groove, No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Long-r Life!

CS-511

THE GATES RUBBER COMPANY
DENVER, U. S. A.
The World's Largest Makers of V-Belts

Gates VULCO ROPE DRIVES
Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U. S. and 71 Foreign Countries

Now! It's as Easy

Tuffy

union Wire Rope

THESE **Tuffy's** ARE ALSO SPECIALLY DESIGNED FOR SPECIALIZED MINING USES

Tuffy Slusher Rope

Improved 3-19 gives maximum resistance to abrasion ... is rigid, non-unreeling, to eliminate drum crushing, yet plastic and flexible enough to take up slack fast.

Tuffy Mining Types

Mining Hoisting Rope, Crab Slusher Rope, Winch Rope — all Lang-formed (Preformed) and Galvanized to give maximum safety and service—at ultimate lowest.

Tuffy Slings

Patented lubricated wire fabric construction gives extra flexibility and stamina. Proof-tested to twice safe working load. Non-kinking. Non-crushing. 10 types.

as 1-2-3 to Order

DRAGLINES

ONE, length . . . TWO, diameter . . . THREE, the name "Tuffy." That's all the information you need to order Tuffy Draglines—and get all the extra advantages of this tougher, stronger wire rope. No complicated specifications . . . no time-wasting, detailed forms to fill out.

Made for Extra Yardage . . . Extra Service

Ask the men who have used Tuffy Draglines about Tuffy's yardage and service. You'll find convincing proof that Tuffy actually handles more yardage—at a lower ultimate cost—and gives longer service on the job. Here's why Tuffy gives you these extra advantages:

EXTRA FLEXIBILITY. Wires of the finest steel in a construction designed for universal dragline service, gives Tuffy Draglines the extra flexibility needed without sacrificing other qualities.

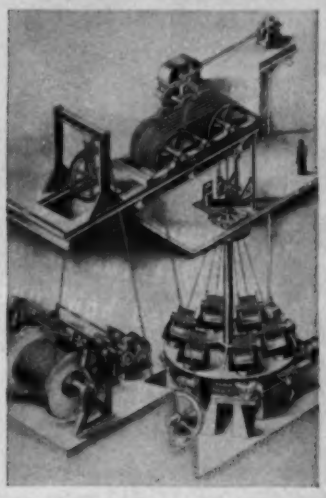
MAXIMUM ABRASIVE RESISTANCE. Obtained by finer technic in construction with materials toughened to withstand more abrasive wear.

EASY TO HANDLE. It's pliable. Tuffy Draglines spool better and ride better on grooves.

HUGS DRUM WHEN CASTING. Jerking, pulling and bending stresses do not distort its pliable construction.

Put Tuffy Dragline to the test on one piece of your equipment. Compare it for length of service and yardage with other wire rope draglines. You'll see why so many operators standardize on Tuffy Draglines for their whole operation.

THIS GIANT MACHINE TURNS OUT 27 TONS OF UNION WIRE ROPE IN ONE CONTINUOUS LENGTH



It stands 4 stories high . . . has capacity for laying rope from ¾" to 4" in diameter. This massive closing machine in Union Wire Rope's modern plant is used in the production of Tuffy Draglines, boom ropes, boom support ropes, hoist ropes, crowd and retract ropes, counterweight ropes, holding and closing ropes, and other specialized wire rope for mining.

Send For These Folders Today

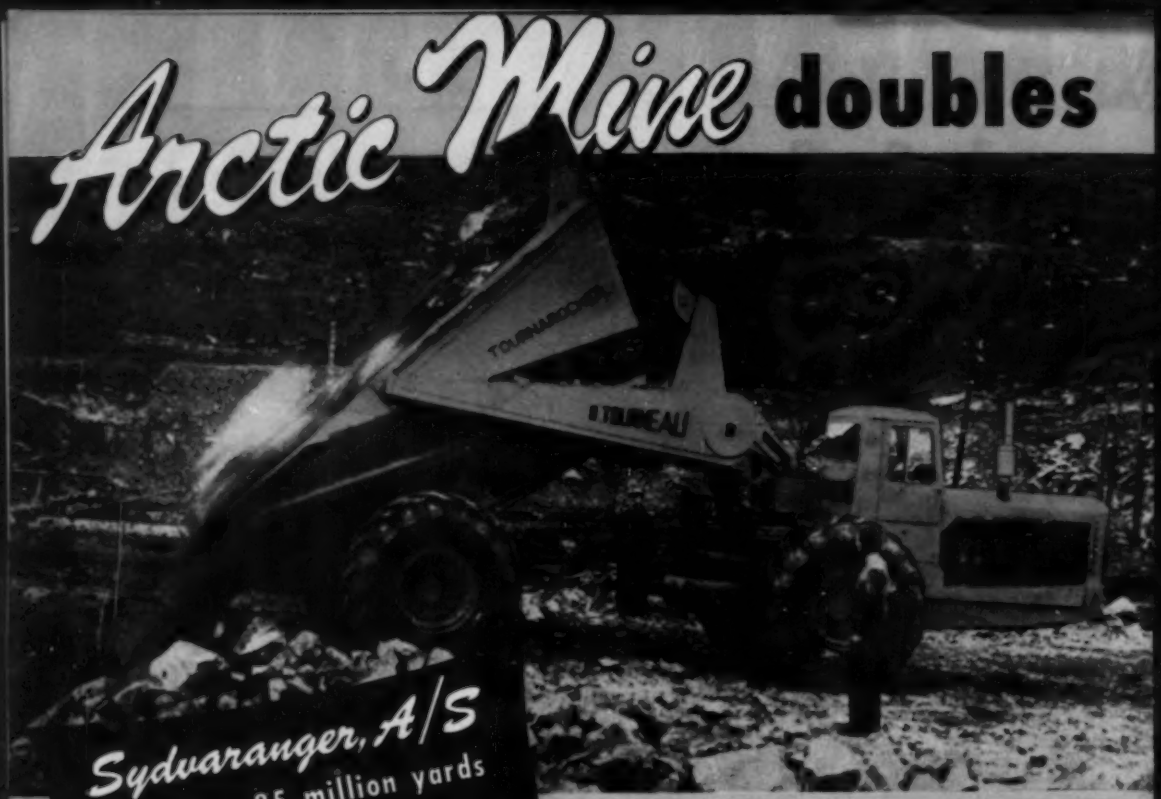
See how you can cut operating costs . . . reduce downtime . . . gain longer, better performance with Tuffy Wire Ropes for mining. Mail coupon today.

UNION WIRE ROPE CORPORATION
Specialists in Wire Rope
2320 Manchester Ave. Kansas City 3, Mo.

Name and Illustrated folder on ☐ Tuffy Hoisting Ropes
☐ Tuffy Mining Machine Ropes ☐ Tuffy Slings
☐ Tuffy Draglines

Name
Address
City State

Arctic Mine doubles



Sydvaranger, A/S is moving 25 million yards of rock with 12 LeTourneau 40-ton rubber-tired haul units

At Kirkenes, Norway, 215 miles north of the Arctic Circle, approximately 25 million yards of rock are to be removed to uncover magnetite ore. Deepest point of excavation in the vast, open-pit mine will be about 350 feet below the ground surface. Ultimate production goal is 2.3 million tons of ore annually. This calls for removal of 12,000 tons of rock overburden and iron ore every 24 hours, year-around, in temperatures which range from 86° F. above zero to 31° below.

To achieve quickly and maintain this heavy production schedule, Sydvaranger, A/S, well-known firm from Oslo, Norway, assigned all hauling to a fleet of 12 LeTourneau big-capacity, rubber-tired Tournarockers. Carrying approximately 40 tons of rock each trip, these giant, rear-dump trucks haul from shovel to crushing plant at high speeds, dumping their loads at a touch of an electric switch. At start of operations, Sydvaranger originally brought in 6 of these modern hauling units, finding their performance so dependable and satisfactory, they added 6 more.

The enterprising Norwegian firm has also modernized pit and haul road maintenance with 2 LeTourneau high-speed Tournadozers (illustrated right). These mobile Bulldozers, rolling on giant tires, travel at speeds up to 19 m.p.h. They built the main haul road from mine to crushing plant, and handle clean-up around all shovels in the pit.

To you, this advanced earthmoving equipment can also mean lower costs and increased production on your mining operations. See your nearest LeTourneau Distributor, or write us direct for complete information on high-speed Tournadozers and rear-dump Tournarockers. In addition to 40-ton size, revolutionary Tournarockers are also available in 35-ton, 16-ton and 9-ton sizes. Tournarocker prime movers can also be used to power Carryall Scrapers, bottom-dump wagons, cranes, flat-beds, and other auxiliary interchangeable hauled units, thus assuring you of continuous profitable operation. Investigate TODAY.

LET

Mail today to: **R. G. LeTOURNEAU, INC., Peoria, Illinois**

NAME_____ TITLE_____

COMPANY_____ Dept. or Div._____

STREET_____

CITY_____ STATE_____

Send us specs., price and performance data on

☐ 35-ton or larger Tournarockers
☐ 16-ton ☐ 9-ton

☐ Also send facts on 180 h. p., rubber-tired Tournadozer.

TOURNAROCKER fleet

Hauls rock—At Kirkenes, all hauling from stripping shovel to crusher was assigned by Sydvaranger, A/S, to their twelve 40-ton Tournarockers.

Handles clean-up—This high-speed Tournadozer is one of 2 in use for shovel clean-up and haul road maintenance in the Norwegian iron mine.

LETOURNEAU
PEORIA, ILLINOIS

TOURNAROCKERS

TRACTION ADVANTAGES of A CRAWLER PLUS HIGH-SPEED on RUBBER

PARIS MANUFACTURING COMPANY

Announces

THREE *NEW* DRILLS

The PARMANCO Coal Drill will drill 2½ inch holes at a speed of up to six feet per minute in #5 coal. Equipped with heavy duty truck-type transmission and rear end and a complete hydraulic feed, the drill is operated by one man from the control seat. It is made in two sizes with a 12 h.p. or 25 h.p. gas motor and all units are completely self-contained and enclosed in oil-tight cases.

ALREADY USED by

Big Band Collieries, Inc.	1	Enos Coal Co.	1
United Electric Coal Co.	6	Southwestern Ill. Coal Co.	1
Fairview Collieries Corp.	2	Truax-Traer Coal Company	2
Colonial Coal Co.	1	Refractory Field	
Little Sister Coal Co.	1	Harbison-Walker Refractories Co.	1
Hanna-Sinclair Coal Mining Co.	6	Mexico Refractories Co.	1
Sherwood-Templeton Coal Co.	1	A. P. Green Fire Brick Co.	1

THIS UNIT IS DELIVERING 6-INCH SHOT HOLES — READY FOR LOADING at Better Than Two Feet a Minute ! ! !

The new PARMANCO Hi-Speed Horizontal Drill is completely redesigned around a 40 h.p. engine with four drilling speeds which, in field tests, has cut one-third off the footage drilling time —a cost-per-drilling-foot saving that we are passing on to the strip mine operator and contractor at no increase in our price. In addition the drill is equipped with a starter and generator, dual type front wheels, truck type rear axle with mechanical brakes and a traction drive with both forward and reverse.

PARIS MANUFACTURING COMPANY

Paris, Illinois

YARDAGE MILLIONAIRE

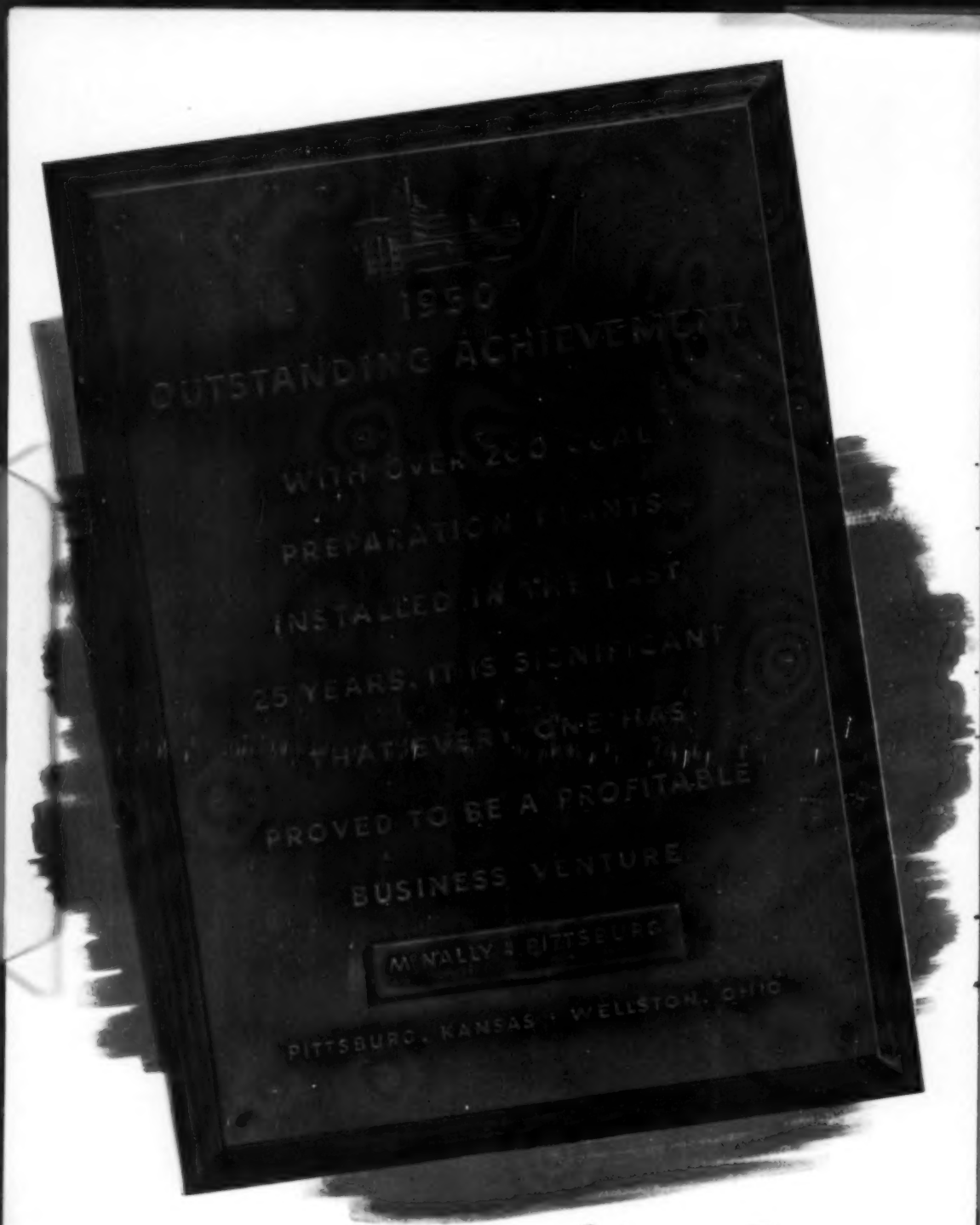
This Bucyrus-Erie 1050-B stripping shovel is now in its eighth year of service in an Illinois coal mine, and has established consistently outstanding production records in millions of yards moved every year. In overburden averaging 45 feet in depth, with a maximum of 80 feet, the 1050-B is on the job three eight-hour shifts daily, every day in the week.

It is dependable high output like this that makes Bucyrus-Erie stripping shovels and draglines first choice wherever high overburden ratios threaten economical coal recovery. Their range, capacity, speed and reliability come from the *years ahead* design made possible by Bucyrus-Erie's unequalled experience in the design and construction of excavating machinery of all sizes and types.

96L50

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN



Semper Paratus

McNally Pittsburg Manufacturing Corporation—*Manufacturing Plants:* Pittsburg, Kansas • Wellston, Ohio
Engineering and Sales Offices: Pittsburgh • Chicago • Rio de Janeiro • Pittsburg, Kansas • Wellston, Ohio

ORCHIDS TO THE OPERATORS

who made this achievement possible

TRUAX-TRAER COAL COMPANY, CEREDO, WEST VIRGINIA
CONSOLIDATED COAL CO., JOHNSON CITY, ILL.
AYRSHIRE COLLIERIES CORP., DANVILLE, ILL.
U. S. COAL & COKE CO., GARY, WEST VIRGINIA
SNOW HILL COAL CORP., TERRE HAUTE, INDIANA
UNITED ELECTRIC, CUBA, ILLINOIS
HOMESTEAD COAL CO., MADISONVILLE, KY.
BLACKFOOT COAL & LAND CORP., EVANSVILLE, INDIANA

. . . and to operators who are thinking about new plants . . . additions to existing plants . . . or replacement of equipment in '51, we offer the service of our consulting staff without charge or obligation.

McNally Pittsburg Manufacturing Corporation—*Manufacturing Plants:* Pittsburg, Kansas • Wellston, Ohio
Engineering and Sales Offices: Pittsburgh • Chicago • Rio de Janeiro • Pittsburg, Kansas • Wellston, Ohio

THE NEW INTERNATIONAL LOADSTAR

is built for a long, hard future

Model for model, Loadstars are the most rugged of all the rugged trucks in the International L-Line.

There's a special reason why this is so. Right from the drawing board stage, Loadstar models are specialized for work on assignments that give trucks a real beating.

You get a truck built for rough work

It's no wonder Loadstars thrive on hard knocks. Inverted "L" type frame reinforcements, heavier rear springs, and oversize rear axles are among the "geared for punishment" features that make them more than a match for the toughest jobs. Here is heavy-duty engineered ruggedness at its rugged best.

You get extra savings

Just wait till you find out how much lower operating and maintenance costs can be when you have a Loadstar. You get the kind of savings that have kept Internationals first in heavy-duty truck sales for 18 straight years.

You get new ease of handling

You get in and out of tight spots with ease. Shorter wheelbases, new wider-tread axles, and steering improvements galore assure you easy turns in the shortest practical circles.

You get a cab-full of comfort!

Tough jobs aren't quite as tough for the man behind the wheel of a Loadstar. He rides in the Comfo-Vision Cab—"roomiest on the road" . . . gets full front visibility through a one-piece, curved Sweepsight windshield . . . enjoys more positive control from a more comfortable position.

There's a Loadstar model just right for your job

Get complete information from your nearest International Truck Dealer or Branch.

International Harvester Builds
McCormick Farm Equipment and Farmall Tractors
Motor Trucks . . . Industrial Power
Refrigerators and Freezers

Heavy-Duty Engineered

INTERNATIONAL TRUCKS

INTERNATIONAL HARVESTER COMPANY CHICAGO

GOODMAN MEETS THE

FOR SHORTWALL CUTTING MACHINES

A proved leader FOR UNDERCUTTING COAL EFFICIENTLY!

Illustrated bulletins complete with detailed specifications for the Type 512 are yours for the asking, but we'd like best for you to see this popular machine *in action, underground.* So many 512's are in service today that we can easily arrange for you to see one near you. Just drop us a line.

Goodman MANUFACTURING COMPANY

HALSTED STREET at 48th • CHICAGO 9, ILLINOIS

BOWDIL

COAL CUTTER CHAIN and BITS

Made by the makers of the

STRONGEST CUTTER-BAR IN THE COAL INDUSTRY

BOWDIL BITS
for lowest cost per ton

THE BOWDIL COMPANY
CANTON, OHIO

Put safety and reliability into your boom supports

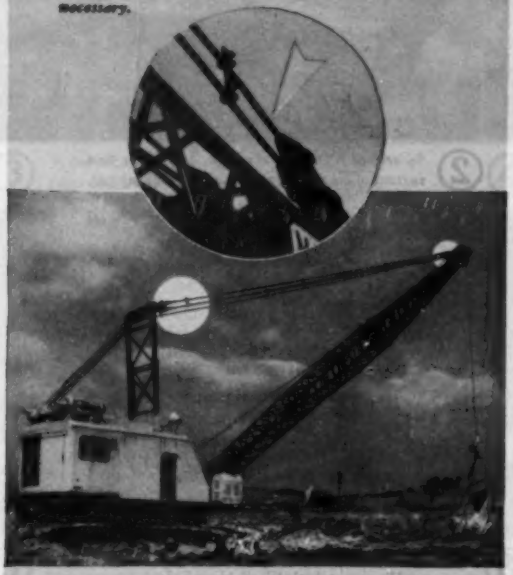
with new Fatigue-Resistant

TIGER BRAND WIRE ROPE ASSEMBLIES

An exclusive development of American Steel and Wire Company

HERE'S THE TROUBLE SPOT

On old style boom supports, vibration was concentrated at the point where the wire rope entered the socket. For machines where vibration was *not* severe, this assembly was satisfactory. But for today's high-power, high-speed machines, *a boom support with much greater resistance to fatigue is absolutely necessary.*



HOW THE TROUBLE WAS ELIMINATED

The New Fatigue-Resistant Tiger Brand Wire Rope Assemblies are an *innovation.* They effectively combat the most severe vibration on power shovels, draglines and cranes. Note carefully the novel end thimble interwoven into the pendant. Vibration is dampened over a long section instead of being concentrated at one point.

2 TO 3 TIMES LONGER LIFE

The new construction has been proved in actual operation to last two to three times longer than the old assemblies — and in some cases even better results were obtained.

INTERCHANGEABLE ON STANDARD EQUIPMENT

You can replace your old boom supports with these new assemblies quickly and easily because essential dimensions such as pin diameters, distance between ears, etc. are the same as for standard open and closed sockets. Send the coupon for complete information.

American Steel & Wire Company
Rockefeller Building, Dept. J-21
Cleveland 13, Ohio

Please send me complete information on your new Tiger Brand Boom Support Assemblies.

Name.....

Title.....

Company.....

Address.....

City.....State.....

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

AMERICAN TIGER BRAND WIRE ROPE

Excellay Preformed

UNITED STATES STEEL

Watch this Blast

Machine-gun camera takes a photo every ⅕ second—shows what really *happens when a blast is shot.*

No wasted explosives gas

① *21 vertical holes, 9,700 pounds of dynamite ready to go.*

② *⅕ second later. See the rock "swell" at first instant of blast . . . but no sign of escaping gas.*

THIS was a typical ROCKMASTER blast by Fauzio Brothers at the Lehigh Navigation Coal Company's Nesquehoning, Pennsylvania stripping operation. Holes were 40 feet deep, with 18-foot spacing, 19-foot burden. The blast was initiated from the bottom of each hole, with ROCKMASTER Nos. 1, 2, 3, and 4 milli-second electric blasting caps.

Whether your job calls for blasting rock, coal, ore, ROCKMASTER blasting means true *controlled force . . . controlled throw . . . controlled breakage.* Write today for your copy of the ROCKMASTER booklet showing how you can profit through the use of the correct numbers of the *sixteen* ROCKMASTER milli-second delay electric blasting caps teamed with the ROCKMASTER system of explosives choice and loading methods. Our technicians will be glad to assist you in applying ROCKMASTER to your operation.

GO!

...No wild rock...even at the peak of the blast!

③ *⅛ second after Photo. No. 2. Rock going up... gases still confined where they do most work.*

④ *High point of the blast! Explosives gas has done maximum work.*

⑤ *As rock begins to fall, first traces of spent gases and smoke seep through broken rock. Burden completely shaken.*

⑥ *Rock ready for the shovel. Only three minutes after traffic was stopped it's on its way again.*

Rockmaster—Reg. U.S. Pat. Off.

ATLAS EXPLOSIVES

"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

NEW "CAT" DW20 TRACTOR AND W20 WAGON

Big Producers!

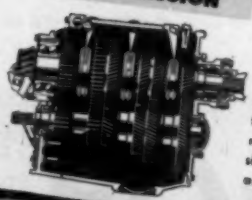
NEW "CAT" DW21 TRACTOR AND NO. 21 SCRAPER

LOOK UNDER THE HIDE

PISTONS

"Caterpillar" pistons are made of strong, lightweight aluminum alloy. Stationary oil jets cool pistons and lubricate piston pin and bushings. Chrome-faced top compression ring, seated in cast-iron band, insures long life and trouble-free operation.

TRANSMISSION



The "Caterpillar" transmission is of constant-mesh type with gears of high-quality, pre-tested alloy steel, heat treated for long wear. Final machining and finish shaving assure accuracy and quietness.

THESE power twins are the largest units in a complete line of "Caterpillar" equipment. They combine high speeds with high capacities to meet today's demands for increased coal production for both civilian and military needs. They give you the choice of 2 or 4 wheels in husky hustlers built to stand up under the toughest stripping and going.

For big production on long hauls, use the 4-wheel "Cat" DW20 with its top speed of 26.6 m.p.h. The DW20 offers 2 matched trailed units. The W20 Wagon—heaped capacity, 25 cu. yds. And the No. 20 Scraper—heaped capacity, 20 cu. yds. The DW20 is also available with the No. 20S Bulldozer.

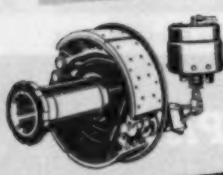
For big production on jobs best suited to 2-wheel rigs, you've got the edge with the "Cat" DW21. Trailing the No. 21 Scraper, which has a heaped capacity of 20 cu. yds., its top speed is 20 m.p.h.

Both these speedy giants are powered by the new 6-cylinder "Cat" Diesel Engine, producing 225 HP. available at the flywheel. Both can work under dragline, shovel or clamshell—and the DW21-No. 21 unit is self-loading. For complete data, see your "Caterpillar" dealer. Under today's conditions, it's a good move to talk over your requirements *now* with him. He's as close as your phone for service or information—call him today!

CATERPILLAR, PEORIA, ILLINOIS

...for built-in quality!

BRAKES



Large 22-inch diameter air-activated "Caterpillar" brakes, with heavy-duty, molded linings, insure quick, smooth braking action. Independent drive wheel brakes aid in close-quarter steering.

POWER STEERING

"Caterpillar" power steering is supplied by hydraulic boosters. Natural "feel of the road" steering is retained. Heavy steel stops keep equipment from jackknifing. Mechanical steering is instantly at work in case of hydraulic failure. 90° turning.

CATERPILLAR

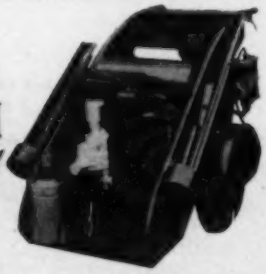
REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT

Continental
EQUIPMENT FOR THE Mining Industry

Continental manufactures a wide variety of conveyors and mining equipment, engineered and constructed to meet the rugged requirements of the mining industry.

Continental's New
DRILLRAM



- Minimum Investment
- Minimum Maintenance
- Cuts drilling time
- One man operation
- Self Propelled
- AC or DC

- TIPPLE CONVEYORS
- SLOPE CONVEYORS
- UNDERGROUND CONVEYORS

Sectional Type Belt Chain Conveyors
(Face and Room Type)

- CAR SPOTTING HOISTS

Write for Belt Conveyor Data Book ID-481-A.

INDUSTRIAL DIVISION
CONTINENTAL GIN COMPANY
BIRMINGHAM, ALABAMA

ENGINEERS CGC ATLANTA • DALLAS • MEMPHIS • NEW YORK CGC MANUFACTURERS

Metallurgy

Craftsmanship

Tolerance Control

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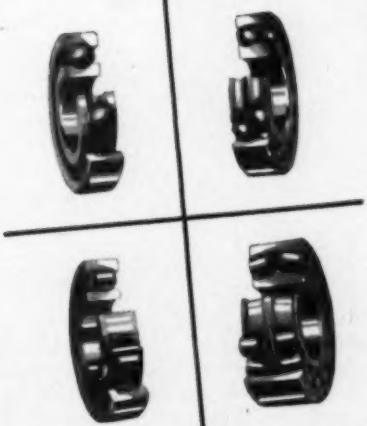
make preference for a reason your guide when you specify ball and roller bearings



Over the years, products acquire a value above and beyond their mechanical qualities—a value proved by their *acceptance* throughout industry. This is especially true of SKF ball and roller bearings, preferred by all industry for one or more of eight good reasons. So when you specify, let preference be your guide. 7200

SKF
BALL AND ROLLER BEARINGS

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.
—manufacturers of SKF *and* HESS-BRIGHT *bearings.*

See for yourself at a nearby operating plant

HOW HEAVY-MEDIA SEPARATION PRODUCES A GREATER TONNAGE OF EXACT-SPECIFICATION COAL at any gravity from 1.25 to 2.50

Unlike the pioneer user, you don't have to buy Heavy-Media Separation on faith or theory today. You can visit operating plants, talk to responsible preparation engineers, check costs and results. You can see how Heavy-Media Separation's unique and exclusive four-stage medium control recovers a greater tonnage of cleaner coal . . . how it minimizes medium consumption. You can determine in advance just what Heavy-Media Separation will do on your coal . . . how closely Heavy-Media Separation will duplicate on a commercial scale the perfect separations obtained in heavy-liquid laboratory tests.

Today, 108 Heavy-Media Separation plants are operating or being built in 20 states, 5 Canadian provinces and 17 foreign countries. *Yearly capacity is approaching 50,000,000 tons, half of which is coal preparation!*

Before you decide on any mechanical or gravity separation method for a new cleaning plant or to supplement your present preparation facilities, it will pay you to inspect an operating Heavy-Media Separation plant . . . to make a comparative study of the better overall grade and recovery this unique and efficient coal cleaning process produces.

As Technical and Sales Representative for Heavy-Media Separation Processes, we will be pleased to assist in arranging your visits to plants near you. We can also run carload tests on your coal in the Heavy-Media Semi-Commercial Plant of the Cyanamid Mineral Dressing Laboratory at Stamford, Conn. Although we do not design or build plants, we can put you in touch with experienced engineering-construction firms who do, including builders of pre-fabricated plants with capacities up to 400 tons per hour. We will work closely with your engineers in the design and initial operation of your Heavy-Media Separation Unit.

Net, we stand ready to help you in every way to achieve higher quality and higher recovery at low cost through the proper application of a Heavy-Media Unit in your cleaning plant.

HAVE YOU RECEIVED MINERAL DRESSING NOTES #18 "COAL PREPARATION"

This 36-page book, just issued, contains a wealth of new data on Heavy-Media Separation. Clearly and concisely, it explains the fundamental principles exclusive to this separation method. With photomicrographs of medium samples from an operating plant, it shows how Heavy-Media Separation employs unique and exclusive applications of magnetomotive force to provide constant control, conditioning and recovery of the medium. It describes typical operating plants, contains test data, diagramatic flow schemes and much other useful information never before published on Heavy-Media Separation Processes.

If you have not received Mineral Dressing Notes #18 "Coal Preparation," we will be pleased to send you a copy. The coupon is for your convenience.

Mineral Dressing Division,
AMERICAN CYANAMID COMPANY
30 Rockefeller Plaza, New York 20, N. Y.

Kindly send me Mineral Dressing Notes #18 "Coal Preparation"

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AMERICAN Cyanamid COMPANY

MINERAL DRESSING DIVISION

30 ROCKEFELLER PLAZA NEW YORK 20, NEW YORK

this "pipe organ" plays a POWERFUL tune for you!

This picture shows the "works" of a modern boiler attached to a huge power generator that turns out electricity from coal to the tune of 150,000 kilowatts—enough to operate 800,000 washing machines simultaneously!

In these 12 miles of pipe, rising 10 stories above the ground, water is turned into superheated steam by burning coal. The steam runs turbine-driven generators which produce electricity for home, farm and factory.

More than half of America's electricity is generated from coal. This past year more than *90 million tons* of coal went into making that electricity. That adds up to nearly one-fifth of the entire mine output of bituminous coal in 1950.

America is fortunate in having all the coal it *needs* to make all the electricity it *wants*. It is doubly fortunate in having an industry that can produce that coal in volume—efficiently and economically.

The American coal industry is made up of thousands of independent mine operators. In recent years, these progressive operators have invested hundreds of millions of dollars in new mine properties and mechanized equipment, in coal preparation plants and research—to bring all coal customers an increasingly *better* product for more *economical* utilization.

Today, no industry in America is better prepared than coal to meet the ever-increasing demands of both civilian and national defense production.

Granted a continuing supply of necessary equipment, transportation and trained man power, America's independently owned and operated coal mines will produce all the coal that's needed to continue to power the nation's progress, in peace or war.

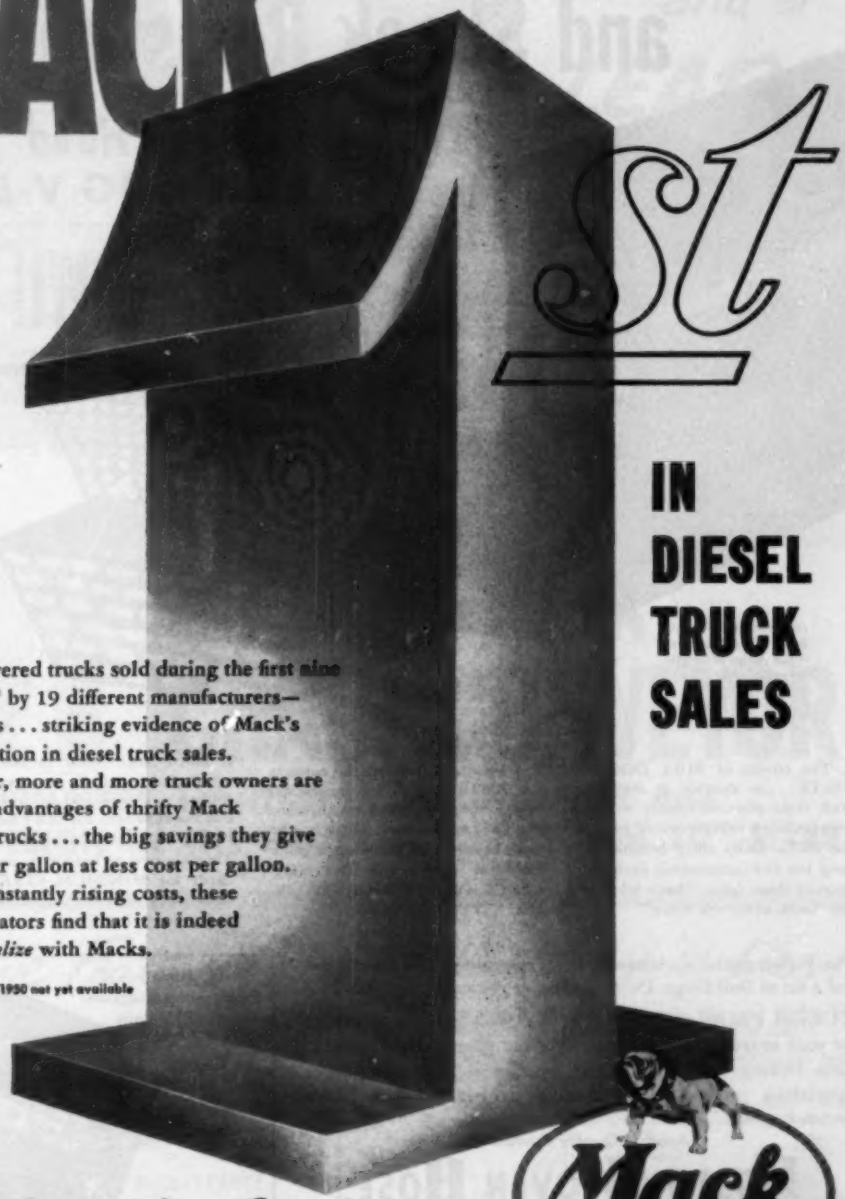
BITUMINOUS COAL

BITUMINOUS COAL INSTITUTE

A DEPARTMENT OF NATIONAL COAL ASSOCIATION

WASHINGTON, D. C.

MACK



1st

IN DIESEL TRUCK SALES

Of all diesel-powered trucks sold during the first nine months of 1950* by 19 different manufacturers—41% were Macks . . . striking evidence of Mack's top-ranking position in diesel truck sales.

The country over, more and more truck owners are discovering the advantages of thrifty Mack diesel-powered trucks . . . the big savings they give in more miles per gallon at less cost per gallon.

In the face of constantly rising costs, these progressive operators find that it is indeed *profit-wise to dieselize* with Macks.

*Final figures for 1950 not yet available

Be Profit-Wise... Dieselize with

Mack TRUCKS

outlast them all

Mack Trucks, Empire State Building, New York 1, N. Y. Factories at Allentown, Pa.; Plainfield, N. J.; Long Island City, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

For Greater Strength and Shock Resistance

"Look Under the Hood" of a BULL DOG V-BELT!

BWH

DEPENDABLE RUGGEDNESS

Industrial V-Belts in A, B, C, D and E sections —full range of lengths from 26"-660"

1. The covers of BULL DOG V-BELTS . . . as durable as they are with their plies of closely woven, bias cut fabric represent only part of the BULL DOG story behind the long life and outstanding performance of these belts. That's why we say "Look under the hood!"

2. Immediately beneath the cover is the BWH-developed compression section of fabric and quality-controlled compounds. This is the basic reason why Bull Dog V-Belts *both* run cooler and DO NOT CRACK OR DETERIORATE UNDER SEVERE FLEXING.

3. Third basic factor in Bull Dog V-Belt quality is the specially engineered BWH Cord Section — exceptional in tensile strength — and the answer to the belt's heavy load carrying capacity and ability to absorb shock loads. Thank a new technique in processing these cords for MINIMUM STRETCH and the advantages of fewer adjustments, less slippage, longer belt life.

Put V-Belt problems behind you — ask your BWH distributor for a set of Bull Dogs. Do it as soon as you can!

TOUGH PROBLEMS INVITED — Don't hesitate to ask us or your nearest BWH distributor about your power transmission belting, conveyor belting and hose problems. We're specialists in making mechanical rubber products work *better, longer.*

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

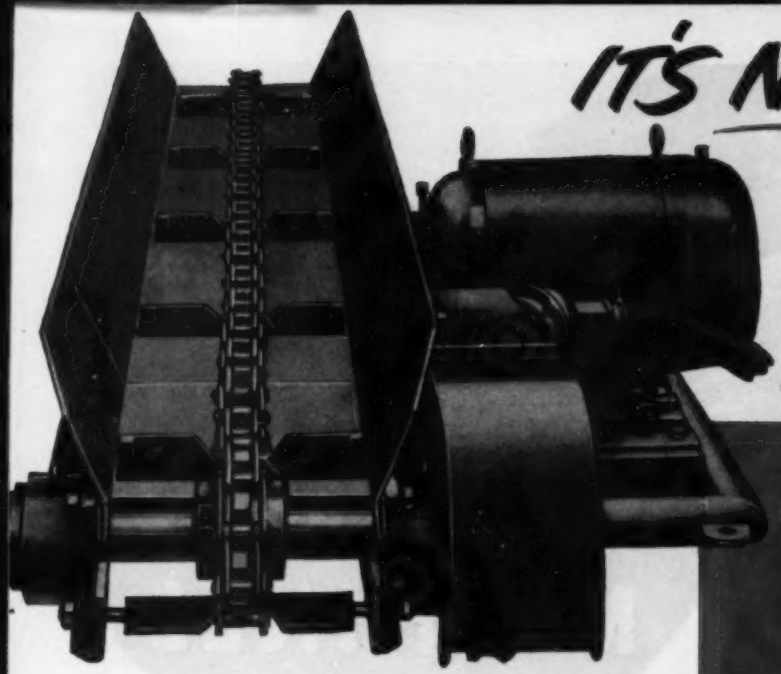
Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS. • P. O. BOX 1071, BOSTON 3, MASS., U.S.A.

BWH
Fractional horsepower (FHP) V-Belts

COMPRESSION SECTION, engineered to withstand continual flexing.

BULL DOG CORDS, comprise a powerful, load-carrying section.



IT'S NEW! and a LEADER

JOY 1951 MODEL FA CHAIN CONVEYOR

THE SIMPLEST, LIGHTEST, MOST COMPACT and EFFICIENT DESIGN IN THE FIELD . . . 12", 15" and 20" SIZES

Exclusive Features!

- ★ V-Belt drive, unaffected by misalignment, eliminates flexible coupling.
- ★ Helical and spur reducer—more efficient than worm reducers.
- ★ Ball-bearing mounted shear-pin sprocket—eliminates wear after shear.

LONGER SERVICE with LESS MAINTENANCE

Advantages You'll Like!

- ★ Compared to conventional drives, the new Model FA is 500 lbs. lighter and requires 4 sq. ft. less area.
- ★ Has non-jamming gravity take-up and drop-forged steel flights—flight integral with the link.
- ★ Available with open or closed-end tail sections. Three chains available: 19,000 to 27,000 lbs. ultimate strength.

Consult a Joy Engineer

W&D CL 5547

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

For Coal Loading
For Coal Stripping
Four Powerful MARION MACHINES

In the 3/4 to 3 1/2 cu. yd. size range

MARION 33-M—Available as a 1¼ cu. yd. coal loader or as a standard ¾ cu. yd. machine. Shovel boom length is 18', handle length 14'-5". Dragline boom lengths, 35' to 50'. Equipped with MARION Air Control. Ball pull, 23,550 lbs.

MARION 43-M—Offered as a 1¼ cu. yd. coal loader or a standard 1 cu. yd. shovel. Shovel boom length is 21'-6", handle length is 16'-4". Dragline boom lengths, 35' to 50'. Equipped with MARION Air Control.

MARION 362—As a coal loader, the MARION 362 is equipped with a 1½ cu. yd. dipper, a 28'-0" boom and 21'-8" handle. As a stripping shovel, the 362 carries a 1¼ cu. yd. dipper on a 28' boom and 21'-8" handle. Dragline boom lengths from 50' to 70'.

MARION 93-M—As a coal loader, the MARION 93-M carries a 3½ cu. yd. dipper, a 34'-0" boom and a 25'-4" handle. As a stripping shovel, the 93-M is equipped with a 2 cu. yd. dipper, a 34' boom and a 27'-6" handle. Dragline boom lengths from 60' to 80'.

If your coal loading or stripping operations call for a shovel or dragline in the ¾ to 3½ cu. yd. size range, be sure to get the complete story on these four MARION machines. Contact your nearest MARION distributor or District office or write to the factory at Marion, Ohio.

MARION
POWER SHOVEL COMPANY
MARION, OHIO, U. S. A.

Offices and Warehouses in all Principal Cities

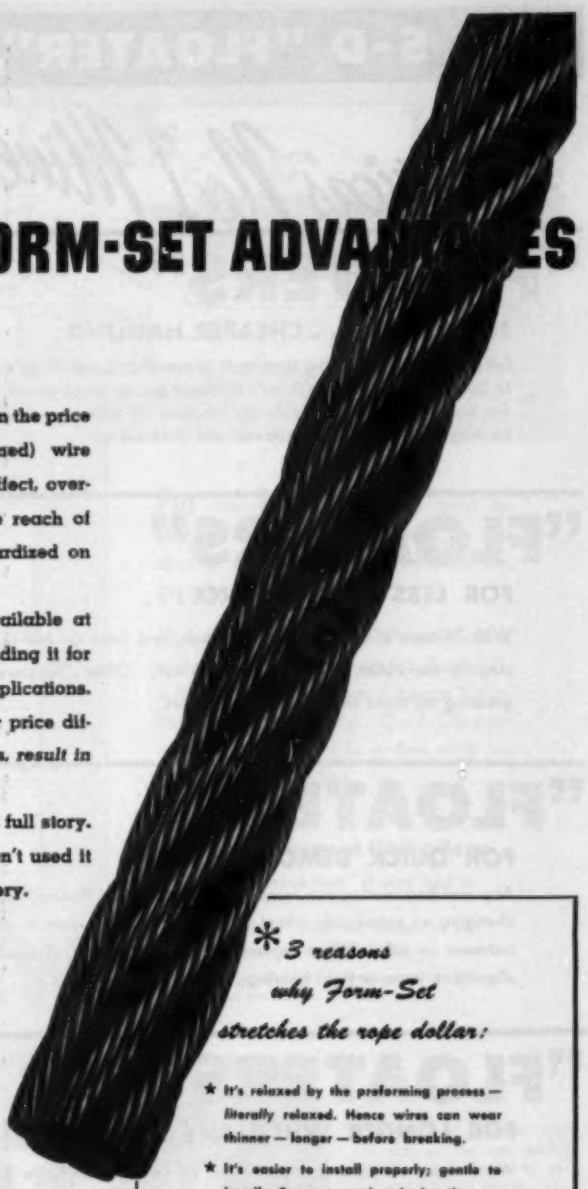
You pay so little more

for these EXTRA FORM-SET ADVA[illegible]ES

Some time ago we announced a big cut in the price differential between Form-Set (preformed) wire rope and the non-preformed type. The effect, overnight, was to bring Form-Set within the reach of many users who had previously standardized on non-preformed.

Since Bethlehem Form-Set is now available at such slight extra cost, we are recommending it for practically *all* hoisting and operating applications. Its advantages not only offset the minor price difference . . . they actually, in many cases, *result in substantial wire-rope economies.**

Ask a Bethlehem man to give you the full story. Then try a reel of Form-Set. If you haven't used it before, you're due for a welcome discovery.



Bethlehem Form-Set wire rope after cutting. Note that preforming eliminates the need for seizing.

* 3 reasons why Form-Set stretches the rope dollar:

★ It's relaxed by the preforming process — *literally* relaxed. Hence wires can wear thinner — longer — before breaking.

★ It's easier to install properly; gentle to handle. Saves expensive rigging time.

★ It's highly resistant to kinking. And, because spooling is tighter, more uniform, there's less crushing and distortion.

BETHLEHEM WIRE ROPE BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

THE S-D "FLOATER"...

America's No. 1 Mine Car Wheel!

"FLOATERS"

FOR FASTER . . . CHEAPER HAULING

Independent engineering firm tests prove that locomotives can pull up to 50% greater loads with no additional power requirement when cars are equipped with S-D "Floaters" instead of other types of precision bearing wheels . . . a big power and time saver!

"FLOATERS"

FOR LESS MAINTENANCE . . .

With "Floater's" solid closed front hub, and back double seal, grease stays in the wheel, dust and dirt stay out. Often "Floaters" require greasing no more than once in five years.

"FLOATERS"

FOR QUICK DEMOUNTABILITY

Any unskilled worker can remove and replace a "Floater" as easily as changing an automobile wheel. Bearings always remain in perfect adjustment on axle. When replaced there's no chance of pinching, misalignment, loose or tight bearings.

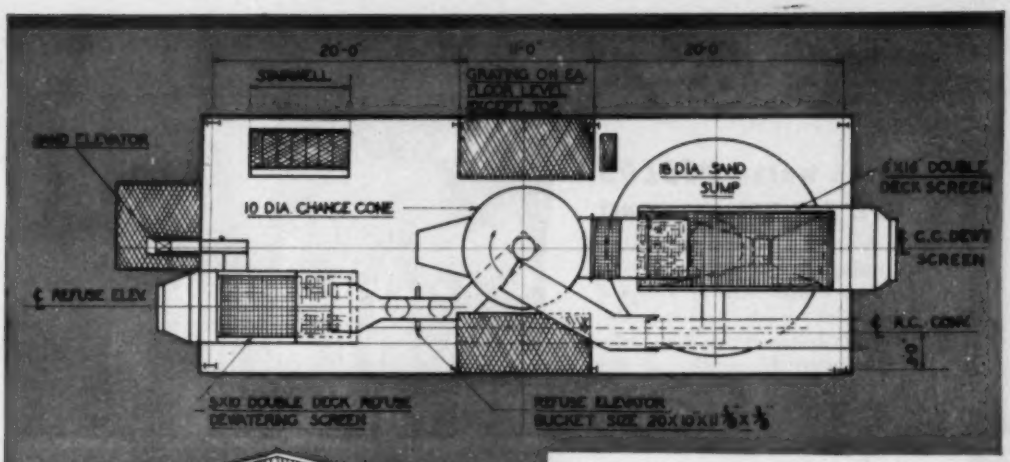
"FLOATERS"

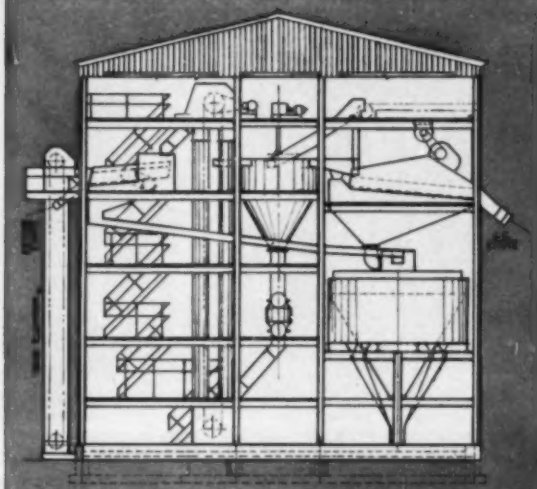
FOR LONGER WHEEL LIFE

We believe our own special mixture of iron and exclusive heat treatment are responsible for making "Floaters" famous for their toughness and long wear . . . such quality is your assurance of perfect satisfaction.

Try S-D "Floaters". Check their savings. Experience proves that once an operator knows what "Floaters" will do for him, he specifies smooth-running "Floaters" for all wheel replacements. For complete information, write Sanford-Day Iron Works, Knoxville, Tenn.

SANFORD-DAY IRON WORKS





For the first time in the coal industry there is an opportunity for the smaller operator to compete in the premium coal market.

Now, the small operator can meet a wide range of premium coal specifications with a modern Chance Original "Heavy Density" Coal Cleaner and at a cost that is in line with his production facilities.

This new Fairmont Unit offers:

1. A "packaged-plant" of cone feed up to 200 tons per hour.
2. A unit as rugged and modern as any large plant Fairmont builds.
3. A run-of-mine capacity up to 300 tons per hour.

Something **NEW** *for the Industry*

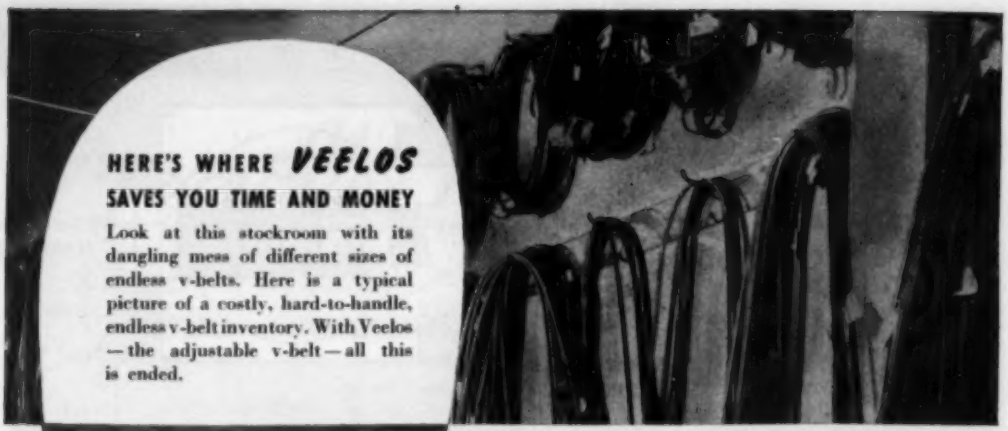
FAIRMONT
"Packaged-Plant"
COAL CLEANER

Consult a Fairmont Engineer on the new markets this plant opens to you. Also discuss with him ways and means for this unit to fit into your present plant.

CHANCE [illegible] HEAVY DENSITY" COAL CLEANER

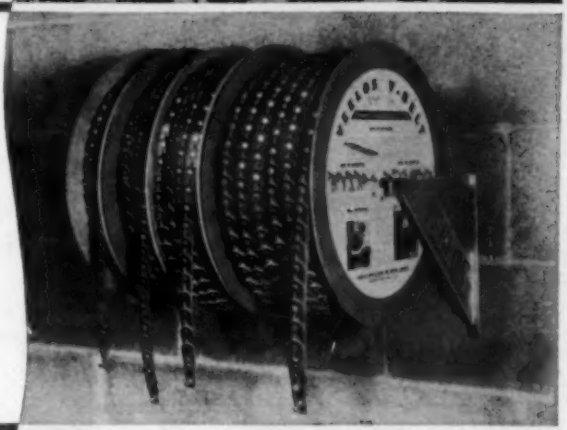
FAIRMONT MACHINERY COMPANY FAIRMONT, WEST VIRGINIA

DESIGNERS AND CONSTRUCTORS OF CHANCE SAND FLOTATION PROCESS FOR WET CLEANING AND AMERICAN PNEUMATIC SEPARATOR FOR DRY CLEANING



HERE'S WHERE *VEELOS* SAVES YOU TIME AND MONEY

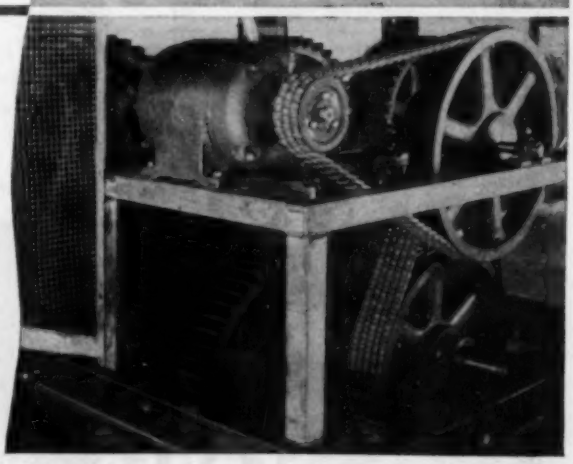
Look at this stockroom with its dangling mess of different sizes of endless v-belts. Here is a typical picture of a costly, hard-to-handle, endless v-belt inventory. With Veelos—the adjustable v-belt—all this is ended.



WITH *VEELOS*, ANY BELT SIZE IS ALWAYS ON HAND

These four reels of Veelos alone can *replace* up to 316 sizes of endless v-belts in the O, A, B and C widths. No more stockroom troubles, no more replacement headaches because Veelos is *always* ready—in the widths you require.

If you are interested in reducing your v-belt costs and increasing your production efficiency, you should have a Veelos Data Book. For free copy of this illustrated book complete with engineering information write*



VEELOS ASSURES MAXIMUM MACHINE PRODUCTION

Veelos is easy to install *without* dismantling outboard bearings. Veelos runs true for vibrationless, full power delivery. Because Veelos is adjustable, uniform belt tension is easily maintained.

VEELOS
THE LINK
V-BELT

ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

Made in all widths in three types: regular, oil-proof, static conducting. Also double V in A and B. Packaged on reels in 100-foot lengths. Sales engineers in principal cities; over 350 distributors throughout the country. Veelos is known as VEELINK outside the United States.

*MANHEIM MANUFACTURING & BELTING COMPANY, MANHEIM, PA.

Drivers Prefer Trucks with

EATON

2-Speed Truck

AXLES

Drivers report they are less fatigued after long trips on trucks with Eaton 2-Speed Axles. Eaton equipped trucks are easier to maneuver; quicker on the get-away in traffic; climb hills more smoothly; highball on the open road yet have plenty of power to pull out of tough spots.

These advantages are possible because Eaton 2-Speed Axles give drivers twice the conventional number of gear ratios from which to choose the one best suited for road and load conditions.

Truck owners also are pleased with Eaton 2-Speeds by the saving in maintenance costs, faster schedules, lower cost per mile. Your dealer will be glad to explain how Eaton's planetary gearing, positive lubrication and other exclusive features make Eaton axles last longer.

Axle Division

EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

PRODUCTS: SODIUM COOLED; POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • JET ENGINE PARTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS SPRINGTITES • SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS.

J&L STEEL

Wherever You're Mining

J&L WIRE ROPES

are Built for the Job

That's why more and more deep and strip mine operators are specifying J&L Precisionbilt Wire Rope for use on their equipment. They know that J&L has long recognized two factors as vital to wire rope service life:—

1. **The highest quality steel and the most modern methods of manufacture.**
2. **The right wire rope construction to do the specific job.**

To meet these requirements J&L controls the quality of its wire rope in every production step from the high grade ore in its mines through the stranding and closing of the rope on J&L's modern machines. Secondly, J&L provides the right wire rope to do the job by manufacturing a complete line of mining ropes with constructions designed to meet the requirements of every type of equipment and operating condition.

It's no wonder operating men throughout the mining industry have learned to count on J&L. The next time you order wire rope, why not get in touch with your nearest J&L representative? Once you try J&L Precisionbilt Wire Rope you'll agree it's your best assurance of long wire rope service life and minimum equipment downtime for re-rigging.

Write today for your free copy of our handbook, "Wire Rope is a Machine". It's written for the man on the job and gives valuable information on J&L Wire Rope, how to get the most out of your rope and the right ropes for the job. Address your request to: Jones & Laughlin Steel Corporation, 411 Jones & Laughlin Building, Pittsburgh 30, Pennsylvania.

JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY *and* JALLOY *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

Command Performance

where horsepower goes to work

Up, down . . . in the pit or out . . . *command performance* is yours with a Fuller transmission or auxiliary combination in your rig. For Fuller offers you 101 transmissions and auxiliary combinations to give you *exactly* the *right gear ratio* for your truck—whether it be *two-tons* or the *biggest.*

With the short, smooth shifts, and right gear ratios in Fuller transmissions, your driver can keep the engine turning at its most effective speed . . . saving seconds here and minutes there to maintain higher average speeds.

That's why you will find the Fuller trademark on the gear box in more and more heavy-duty trucks.

Make your next transmission a *Fuller* transmission—and assure command performance from your rig.

Fuller TRANSMISSIONS

FULLER MANUFACTURING COMPANY Transmission Division, KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

The Great Mining Tire that does the "Impossible."

WHAT DO WE MEAN "IMPOSSIBLE"?

We mean that never before—and now for the first time—you've got a mining tire with **SUPER-TRACTION OFF THE ROAD** where you need it—with a **SMOOTH NON-SKID, LONG-WEARING ROLL ON THE HIGHWAY** when you want it.

WE ALSO MEAN you get tread compounds ***JOB-FITTED TO YOUR EXACT REQUIREMENTS,*** compounds that stand up under the toughest conditions that ever faced a tire. ***THE ONLY SUCH TIRE IN THE WORLD.***

★ ***70% Deeper Traction Tread*** — this feature alone is good for up to ***50% MORE ACTUAL MILES.***

★ ***Entirely New Inner-Cavity Form*** to cut carcass strain—actually built and round-moulded to the tire's inflated shape—for today's wide-base rims. Reduces shoulder and tread stress and strain. This is how Fleetmaster can build its **EXTRA TREAD DEPTH** and **THICKER UNDER-TREAD.**

★ ***More Rubber Contacts the Road*** as mileage increases. Result? Longer wear—more miles.

Get Our Complete Proof Demonstration Today! A Phone Call Does It—To Your Nearest U. S. Royal Dealer!

UNITED STATES RUBBER COMPANY

Steer clear of lubrication troubles in shaker screen eccentric straps with

You'll find in Gulf Cam Grease all the properties necessary to provide sure protection for shaker screen eccentric straps under most operating conditions. You'll make fewer bearing replacements, avoid lubrication problems, and reduce maintenance costs.

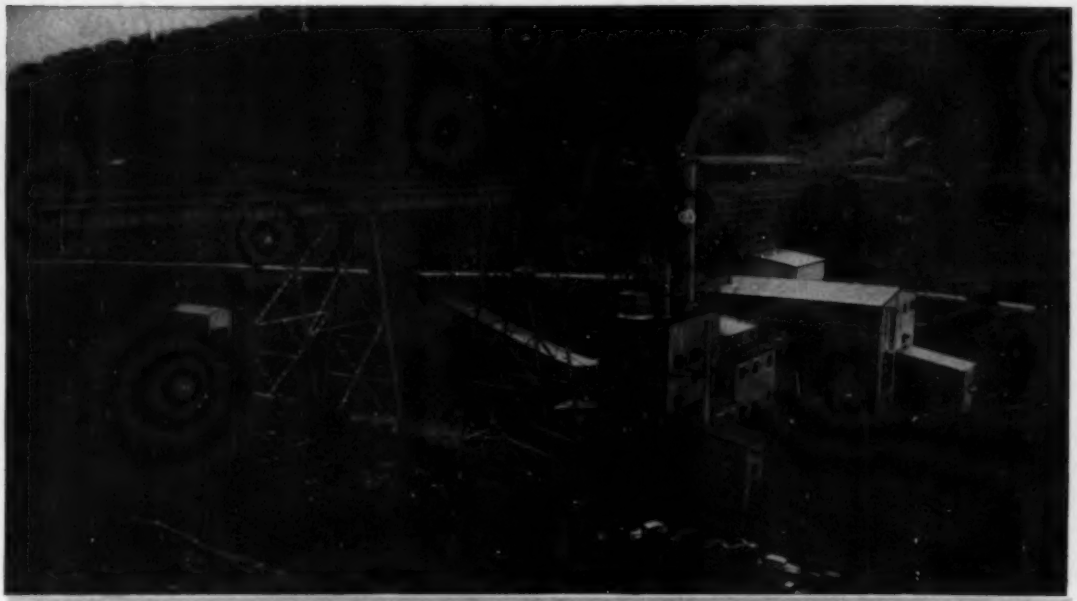
Gulf Cam Grease has a high dropping point and doesn't leak out of eccentric strap bearings even at high operating temperatures. Thus you prevent excessive lubricant consumption, starved bearings—and eliminate a safety hazard.

Because of its exceptional stability at high temperatures, it does not separate nor oxidize appreciably in the most severe service—additional assurance of continuous protection. Unlike most high-temperature lubricants, Gulf Cam Grease is effective where wet conditions prevail—is not readily washed out of the bearings.

Gulf Cam Grease is recommended for the lubrication of plain sleeve bearings in the eccentric straps of shaker screens in breakers and preparation plants.

For further information on Gulf Cam Grease and for expert help on other phases of lubrication in your mine, call in a Gulf Lubrication Engineer today. Write, wire, or phone your nearest Gulf office. Gulf Oil Corporation · Gulf Refining Company, Gulf Building, Pittsburgh 30, Pennsylvania.

FIFTY YEARS OF SERVICE
1901 GULF 1951
PETROLEUM AND ITS PRODUCTS



"Here's how the Leatherwood Plant keeps pace with underground mechanization"

By RICHARD G. MILLER, ROBERTS and SCHAEFER COMPANY

RICHARD G. MILLER

A veteran of 41 years with Roberts and Schaefer Company, Richard G. (Dick) Miller is truly a pioneer in the field of coal preparation. As district manager of the R & S Huntington office, Mr. Miller has practically "lived" with the New Leatherwood Mine preparation plant since it was conceived in 1949 . . . right up to the present time. This is his story of the "whys" and "hows" behind this outstanding plant.

"Since 1945, the Blue Diamond Coal Company has been mining premium domestic coal at their Leatherwood Mine in Kentucky. By 1948 they had found that their over-all operations had become greatly unbalanced—like many other mines, the underground mechanization program had far surpassed its surface preparation facilities.

"In order to correct this condition, a preparation plant was developed, and building begun in 1948 by Roberts and Schaefer Company.

"This followed a period of study and is a modern plant operating to meet both competition and changing customer requirements on a profitable basis.

"Since its completion the plant has come to be regarded as one of the most outstanding of its kind in the United States . . . truly, a design of modern arrangement and utility. All coal to be prepared is delivered to the plant from drifts on opposite sides of a valley via a 750-foot-long trestle having two haulage-ways. Bottom dump cars discharge run-of-mine coal into two 1250-ton storage bins constructed integrally with the trestle.

"The capacity of the Leatherwood Mine has a potential production rate of 2,000,000 tons of clean coal yearly, which is a testimonial to its production capabilities."

Here again, is a typical example of how Roberts and Schaefer Company solves the most exacting of coal preparation problems. As in the case of the Leatherwood Mine, R & S's advanced research methods, engineering know-how and constantly improved handling equipment mean the difference between Profit and Loss.

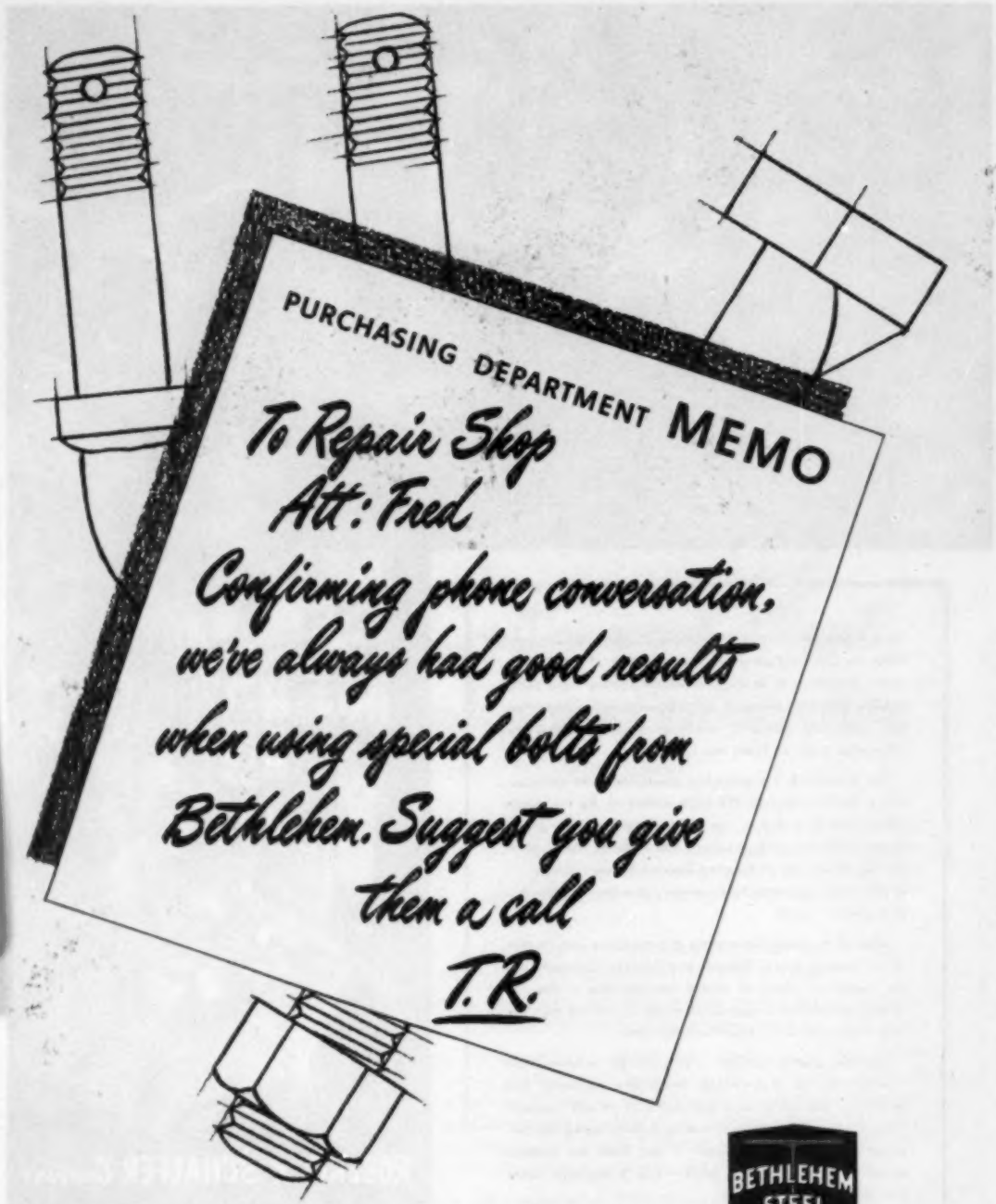
The broad R & S engineering, construction and manufacturing facilities enable this organization to do the whole job or any part of it . . to create completely new plants or modernize obsolete structures and methods. The result is always: Producing of Premium Coal at Premium Prices . . a plant that operates to its owner's complete satisfaction and greatest profit.

One of the finest testimonials any company can receive is the "repeat order." Roberts and Schaefer Company has an impressive record of repeat-contracts due to this one simple reason: R & S-engineered plants do the job they are intended to do. You couldn't ask for more!

Consider your own plant . . is it efficient, economical, is it measuring up to increased competitive pressure? And here's an extremely important question to ask yourself: "Are the benefits of modern mining methods being lost because your plant is obsolete?" If you have the slightest doubt about any of these points—R & S engineers invite you to consult with them.

ROBERTS & SCHAEFER COMPANY

130 North Wells Street, Chicago 6, Illinois
1314 Henry W. Oliver Bldg., Pittsburgh 22, Pa.
254 West 54th Street, New York 19, N. Y.
P. O. Box 570, Huntington 10, W. Va.


PURCHASING DEPARTMENT MEMO
To Repair Shop
Att: Fred
Confirming phone conversation, we've always had good results when using special bolts from Bethlehem. Suggest you give them a call
T.R.

Other Bethlehem Fasteners for the Mine

TRACK BOLTS • RIVETS • THREADED RODS
NUTS • SPIKES • ROOF BOLTS AND ACCESSORIES

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

WATCH THE LOADS GO THROUGH—
SEE THE EARNINGS GO UP!

with

Firestone
TIRES

OPERATORS who keep a close eye on earnings know that they must keep tire costs at a minimum to have a profitable operation.

With Firestone Tires you can substantially reduce your costs because they are especially engineered — in tread and sidewall design . . . in bead and ply construction . . . in every minute detail — to fit your particular requirements.

Whether it's strip mining, earth moving, or rock work, Firestone has a tire that will cut downtime and maintenance costs and keep men and equipment on the job.

See your nearby Firestone Dealer or Store. Let them look over your equipment and make an on-the-job analysis of your tire requirements. Let them show you how Firestone Off-The-Highway Tires will save YOU money.

Listen to the Voice of Firestone on radio or television every Monday evening over NBC

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PLAN

LOAD

DETONATE

For better BLASTING!

WITH PRIMACORD

The many advantages of Primacord make it the choice where safety, simplicity of hookup, and ease of handling are factors to be considered.

Primacord, because of its speed, detonates practically instantaneously, yet the infinitesimal lag between holes and rows of holes obtains greatest results from a minimum quantity of explosives.

Because it cannot be set off by friction, sparks or ordinary shock and is impervious to stray electrical currents, Primacord offers a safety factor to many blasting operations.

Primacord is wound on easy to handle lightweight spools, so that loading and hook-ups are done easily.

4 Types of Primacord

Primacord is made in four standard types, each designed to obtain greatest effectiveness under varying working conditions — each with the same high degree of dependability.

PLAIN PRIMACORD. For shallow holes and surface trunkline use, Plain Primacord is recommended. Although light in weight (a 1000-foot spool weighs only 19 lbs.) it has tensile strength of 113 lbs.

REINFORCED PRIMACORD. For deep holes where extra tensile strength or resistance to abrasion are desirable, depend on Reinforced Primacord. Tough, but resilient and easy to handle, Reinforced Primacord has the same detonating qualities as other Primacord-Bickford types. Weight 20 lbs. per 1000-ft. spool.

WIRE COUNTERED PRIMACORD. Armored with closely stranded brass wire, Wire Countered Primacord is the answer to problems involving deep, ragged holes and high abrasive conditions. The wire sheath also increases the tensile strength to 220 lbs. Weight per 1000-ft. spool, 35 lbs.

PLASTIC REINFORCED PRIMACORD. To meet the demand for a strong, waterproof detonating cord resistant to abrasion and to the acids commonly encountered, Ensign-Bickford developed Plastic Reinforced Primacord. With tensile strength of 250 lbs., users find it ideal for extremely deep holes, river crossings, or where water is a problem. Weighs 22 lbs. per 1000-ft. spool.

Blasters who use Primacord consistently agree there is no substitute. For complete information, consult your explosives supplier . . . or write to us direct.

THE ENSIGN-BICKFORD COMPANY

Simsbury, Connecticut

Also Ensign-Bickford Safety Fuse — Since 1836

P-51

PRIMACORD-BICKFORD Detonating • Fuse •

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

FEBRUARY, 1951

IVAN A. GIVEN, EDITOR

New Job . . . New Opportunity

THE COAL-MINING PATTERN for 1951 is in many respects a familiar one. On the one hand, there is a rising demand for fuel for the defense effort. On the other, coal men already report growing difficulty in securing men, equipment, supplies and railroad cars, with prices and labor stability as added complications, not to mention oil and natural gas competition—particularly the latter. Thus, the situation parallels closely the pattern of World War II, except that in the present period re-armament is piled on an economy already stretched tight, with the result that tight spots are developing relatively faster. By the same token, the pressure on production men everywhere—coal included—for the utmost ingenuity in getting out the goods with a minimum of manpower, equipment and materials is that much greater.

All the signs at the moment strongly indicate that the bituminous industry will be called upon for at least 550 million tons in 1951. This is a substantial increase over most estimates of even a month or six weeks ago—and if the defense program really gets rolling even this total might be upped. Anthracite prospects are equally good, especially if the return to normal winter temperatures continues throughout the next season. All this is based on the progress in the established fields of consumption. In addition, it is entirely possible that needs for an assured supply of petroleum products might lead, for example, to the construction of full-scale synthetic-fuel facilities in the near future. If such facilities are built, coal has the edge as the raw material, according to available indications.

Thus, coal has a job on its hands once again. Can it handle it? There is, of course, little question that it can. It did it in World War II, though the difficulties were perhaps not quite as great as it appears they may be in the future if the situation gets more serious. Since World War II—and particularly in the past year—coal has experienced a shaking-down period, has gained additional experience in handling its problems, and has made major progress in mining efficiency, preparation and safety. As evidence, reports of 50 tons per man on the section were relatively frequent in 1950, new equipment and new methods greatly extended the preparation range, and, as an example of safety progress, Iowa, for the first time in 70 years, went through the year without a single fatality. All these gains add up to a solid foundation for meeting future demands for coal with a minimum of manpower, equipment and materials.

This is not to say, however, that efficient operation is the entire answer. In a time of equipment and material shortages, tight manpower and transportation stringencies, such as that ahead, the industry will need help. This, of course, is no new conclusion. As in World War II, the necessary equipment and materials must be made available and manpower must be conserved. This is a job for government, though coal must be ready to present its case and back it up with the facts. In addition, along with coal-mining management, government must exert itself to see that maximum labor stability is achieved, that unfair competition is kept from disrupting normal industry operations, and that coal is assured a price structure that will foster the production of the necessary tonnage.

Coal, to repeat, has a job on its hands—along with a new opportunity to prove its vital role in building the Nation's economy in defense and war, as well as in peace. It can do the job if it has the help its basic importance merits. In doing it, it can speed the return to peace and pave the way to greater progress in the future through better service to the Nation.

W. H. COOKE—"The industry is actively cooperating in establishment of orderly relations with new wartime bureaus."

S. B. JOHNSON—"Many . . . miners are of draft age and steps should be taken to protect enough of them."

A. B. FOULGER—"The greatest problem is J. L. Lewis and the tolerance and sympathy he and his union receive . . ."

The Executives' Forum

How Top Coal Men See 1951

Here's What 17 Executives, Quizzed on 1951 Problems, See Ahead:

Shortages of { Manpower; Machines and Equipment; Railroad Transportation }

Threats of { Labor Unrest; Rising Costs; Federal Controls }

Strength in { Demand for Energy; Advanced Machine Use; Liaison With Government }

William H. Cooke

PRESIDENT, LITTLE SISTER COAL CORP.

CHICAGO, ILL.

BELIEVE MAJOR PROBLEMS coal industry faces for 1951 are as follows:

1. Coping with a rapidly developing war economy with its attendant governmental regulatory and tax problems.

2. A rising cost and a scarcity of major supply items combined with an uncertain labor development.

3. Continuing readjustment of our major markets highlighted by the continued decline of railroad fuel and the indefinite outlook of retail consumption.

The industry is actively cooperating in the establishment of orderly relations with the new wartime bureaus and if it can be assured of materials and supplies as well as full manpower protection, can maintain a high and efficient rate of production.

The industry must have an adequate tax structure to permit it to accumulate adequate reserves for continued development and mechanization.

I do not believe a definite forecast can be made of the new year's production until after firm policy decisions are made in Washington and we know the full extent of mobilization.

P. D. Ritter

PRESIDENT, RED JACKET COAL CORP.

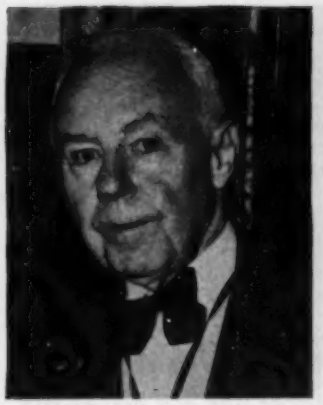
COLUMBUS, OHIO

THE DEFENSE AND MOBILIZATION activities of our nation and others should result in a large 1951 demand for coal.

The industry's major problems will no doubt be centered in short supply of certain materials and in a possible manpower shortage. With increased production, the railroad-car situation might be a serious problem, too.

Solution to such difficulties lies

R. S. WALKER—"We are confronted . . . with migration of miners to defense industries paying higher rates of wages."



CALVIN HOLMES—"Our main problem today is to avoid loss by intensive price-cutting."

H. C. WOODS—"If coal mine prices are frozen, so should coal labor prices be frozen."

principally in the full realization by those in power of coal's vital part in any national effort and in their insistence that our industry receive adequate men, materials and tools to do our job.

David Ingle Jr.

PRESIDENT, INGLE COAL CORP.
ELBERFELD, IND.

MAJOR PROBLEMS FACING coal industry in 1951—our railroad-car supply, disposal cyclone dust and washeries' sludge.

Then there is always Mr. Lewis.

P. J. Allais

PRESIDENT, COLUMBUS MINING CO.
CHICAGO, ILL.

1951 COAL-INDUSTRY PROBLEMS probably shortages of materials, equipment, manpower and transportation. Proper protection or allocation of these items should guarantee a sufficient coal supply.

S. B. Johnson

PRESIDENT, LORAIN COAL & DOCK CO.
COLUMBUS, OHIO

IN MY OPINION, MAJOR ISSUES facing coal industry in 1951 are first, labor. I think steps should be considered and discussion made pertaining to new wage scale that will probably be in effect by Apr. 1. Also, with great advances in mechanization, many of the most efficient miners are of draft age and steps should be taken to protect enough of them to insure essential tonnage.

It will be difficult for price stabilization without wage stabilization and these two items have to be considered as one.

All in all, coal industry is, in my opinion, in splendid shape to deliver necessary tonnage provided that labor is available, wages and prices stabilized.

H. C. Woods

VICE CHAIRMAN OF THE BOARD
SAHARA COAL CO.
CHICAGO, ILL.

1950 PRODUCED about 510,000,000 tons. 1951 should produce this much or more on the theory that we are now at war or preparing for war.

Steel should be allocated in sufficient quantities by governmental authorities to build railroad cars to haul coal. In any war, transportation is essential in business or on the battlefield. Car shortages last year hurt the coal industry.

Governmental agencies should also allocate enough steel and other necessary materials to keep the present coal mines running.

If coal mine prices are frozen, so should coal labor prices be frozen. Our wages are at an all-time high. The steel industry should not make or offer John L. Lewis any increases in wages. They have set the pattern or sold us down the river too many times.

Research on coal and its uses and by-products should be pushed more than ever before.

Imported foreign oil for steam or heating purposes should be stopped. All that oil will be needed for the Army, Navy and Air Corps.

Whitney Warner Jr.

PRESIDENT, THE WARNER COLLIERIES CO.
CLEVELAND, OHIO

MAJOR PROBLEMS: (1) Manpower, (2) supplies and repair parts and (3) railroad cars. Definite and clear-cut government policy regarding drafting of men and allocation of materials urgently needed. Railroad-car shortage can only be corrected by providing more hopper cars for the transportation of coal and reducing the turnaround time.

James Prendergast

PRESIDENT, SUSQUEHANNA COLLIERIES DIVISION, THE M. A. HANNA CO.
CLEVELAND, OHIO

IT WOULD BE MY JUDGMENT from past experiences that the difficulties we face in the production of coal are many.

In the first place, the shortage of manpower is indicated. No doubt, under the stress of the war effort, many employees will go into industries engaged in the production of goods for the armed services and our allies abroad.

We will face a shortage of critical materials, if experience is any criterion.

As to the remedies, all-out mechanization will tend to alleviate the shortage of men. Then, too, the all-

How 1951 Looks to Coal Leaders — Opportunities and Problems Ahead

F. F. KOLBE—"It is vital that labor difficulties . . . be settled without disturbing continued operation of mines."

P. L. SHIELDS—"Efficiency and mechanization must be utilized to increase production per manshift and decrease costs."

WHITNEY WARNER JR.—"Clear-cut government policy regarding drafting of men and allocation of materials urgently needed."

out mobilization effort must recognize that labor must be provided for the coal pits.

As to the shortage of supplies, many ingenious ideas must be considered for the substitution of materials now considered impossible to secure.

One other factor exists, the control of which lies outside our province. This is transportation. So far, the railroads have done very well with their shortage of motive power. Incidentally, they scrapped their coal burners too rapidly. With new equipment on order, this deficit will be overcome, we hope, in due time.

W. P. Tams Jr.

PRESIDENT, GULF SMOKELESS COAL CO.

TAMS, W. VA.

MAJOR PROBLEMS in coal industry coming year are adjustment to war conditions and procurement of necessary supplies for mining coal.

Problem always facing coal is high and rising labor cost in competition with cheap oil and gas.

Further mechanizing of mines only answer.

P. L. Shields

PRESIDENT, SPRING CANYON COAL CO.

SALT LAKE CITY, UTAH

THERE NEVER WAS A TIME in national history, in my opinion, when the allocation of steel was more important and also when it was more imperative that the coal industry be maintained in strong position preparatory to meeting what appears to be the inevitable demands of war.

For these reasons, the recent deluge of applications to construct oil and gas lines through various sections of the Nation should be bitterly opposed by all industry and labor.

In addition, renewed efforts should be made to impress the leaders of coal-mine labor that continued exorbitant demands on the industry will not only further serve to weaken the opportunity to [oppose] such applications, but will jeopardize the future of their present source of livelihood by inviting further encroachment of competitive laborless fuels.

Greater efficiency and further mechanization must be fully utilized to increase production per manshift and hence decrease operating costs.

L. R. Weber

PRESIDENT, LIBERTY FUEL CO.

SALT LAKE CITY, UTAH

MY OPINIONS follow:

[A big problem is the industry's] ability to assure coal users of continuous availability of supply. This can be brought about by continuing operations during wage negotiations. Lack of such arrangement has lost many coal customers to other fuels.

Labor must recognize the type of price competition encountered from laborless fuels and [labor's] continuous demands, which increase costs, must be modified in order for coal to meet this competition.

In the interest of conservation of a limited natural resource, federal government should desist from authorizing the prolific extension of natural-gas lines.

A. B. Foulger

VICE PRESIDENT AND GENERAL MANAGER LION COAL CORP.

OGDEN, UTAH

IT IS MOST DIFFICULT to do adequate justice to the problems of an industry in a telegram.

I believe it most obvious that the greatest problem is John L. Lewis and the tolerance and sympathy he and his union receive from the government on the expiration of the present contract. If he is encouraged by the government, as demonstrated in the sham injunction proceedings a year ago, the effects in all industries will, in my judgment, prove to be the foundation for repercussions of tragic proportions to the future ways of American life as we have known them.

Frank F. Kolbe

PRESIDENT, THE UNITED ELECTRIC COAL COS., CHICAGO, ILL.

PROBLEMS OF THE COAL INDUSTRY in 1951 seem to me to be as follows:

1. Possibility of government control of prices, production and distribution—Coal prices today are no higher than a year ago and there is no indication of any sharp advances in the year 1951. Government control and interference would only serve to retard the activity and development in the industry. Produc-

tion for 1951 is ample for the Nation's needs if no interference develops.

2. Difficulty of securing equipment and necessary repairs to maintain high production—As coal is a vital material for the war effort, mines should be given proper priorities to secure needed equipment and repairs for the highest production possible.

3. Manpower—It is already evident that a shortage of men will exist to produce the required tonnage for the Nation. This must be considered seriously by the proper authorities to maintain sufficient men in the coal industry to keep all mines producing.

4. Certainly no strikes should be permitted in these critical times and it is vital that labor difficulties, both nation-wide and by various producing districts, be settled without disturbing continued operation of the mines.

Calvin Holmes

PRESIDENT, HOLMES-DARST COAL CORP. KNOXVILLE, TENN.

TODAY THE MAJOR PROBLEM in the coal industry is price.

The pressure of a production larger than the capacity of the customers to consume has caused some price-cutting. This is foolish and does not sell any more coal or increase the consumption of coal. And our main problem today is to avoid loss by intensive price-cutting.

J. E. Bowman

PRESIDENT, UTILITIES ELKHORN COAL CO. PIKEVILLE, KY.

DURING THE PAST YEAR AND A HALF, I have not been in a group of coal operators that did not unanimously agree that the biggest problem facing the industry is the competition of oil and natural gas which has been brought about largely by the high cost of producing coal and the high cost of delivering it to the consumer. This simply means that coal has been and is being gradually priced out of the market.

There are only two things that give us any ray of hope, aside from a general improvement in industrial production as a direct result of the rearmament program, and they are as follows:

1. Through a concerted effort by the coal industry, I believe there is a chance that the more conservative recently elected Congress might be prevailed upon to recognize the fact that our oil and natural-gas reserves are being depleted at an alarming rate and something must be done to check the wasteful exploitation of these two valuable American natural resources.

2. The early improvement of continuous loading machines, which I am sure will ultimately be reasonably perfected, will result in considerable labor saving, thereby reducing at least the production cost to some extent. I can see no reason to hope that the transporation cost will ever be reduced. Labor unions have never been known to give up unreasonable wages and short hours regardless of how cognizant they might be of their disastrous effects on the industry employing them. I would not be surprised if the prevailing unfavorable conditions in the railroad industry continue to worsen.

We all know that our steel companies have not kept in step with the growing demand for steel. They can scarcely be blamed for this condition because any recession in our economy would create a very bad condition in that industry. However, with the rearmament program ahead of us and with the opportunity of availing themselves of the accelerated write-off of cost, there should be a substantial number of new plants begun and completed at the earliest possible date. The inevitable expansion of the steel industry will, of course, be helpful to that part of the coal industry that can supply a good grade of byproduct coal.

Your telegram mentioned "major problems facing the coal industry in 1951 and what should be done about them." The above problems and their possible solutions are not just problems and solutions for the industry in 1951. They cannot be corrected in 1951 except possibly (1). I do believe, however, that the natural upswing in industrial production together with some increase in export demand will give us a market for approximately 550,000,000 tons in 1951, or an increase of about 10%.

The Executives' Forum

The Executives' Forum this month looks into 1951. Top coal men, answering telegrams from COAL AGE, define the problems ahead and offer their solutions as the coal industry prepares to play its role in building up the Nation's military strength.

This is the kind of timely reporting you can expect in our new Executives' Forum. You can help yourself, your company and your industry by keeping us posted on your problems and ideas. We'll throw them out for others to comment on, and then we'll publish the results.

J. G. Bradley

PRESIDENT, ELK RIVER COAL & LUMBER CO., DUNDON, W. VA.

I HAVE NEVER been able to predict or see into the future and so have relied on the business advice of Benjamin Franklin as set out in his maxims. I recommend them as protection against the unexpected. They may even be helpful to those who pride themselves on their gift of foresight.

R. S. Walker

PRESIDENT, BRADFORD COAL CO. BIGLER, PA.

ONE OF THE MAJOR PROBLEMS confronting the coal industry for 1951—and I am limiting my views to the Central Pennsylvania fields—will be manpower to maintain production, particularly in the deep mines, for the break-even point.

During the last war, production lost from deep-mine operations was readily picked up by strip or open-pit mine producers. However, most of the marginal coals in the Central Pennsylvania area have been removed by stripping, and if a major war develops, I cannot see how strip mining will pick up the loss in tonnage. The solution to the manpower problem of the industry will be controlled deferments for all miners eligible for drafting.

We are also confronted here in the field, too, with migration of miners to defense industries paying higher rates of wages. The answer to this would possibly be a freeze of all industrial workers.

Availability of equipment both in deep mining and open-pit mining is becoming critical for maintenance of production. This should be handled, as during the previous war, on a priority setup.

The industry here looks for a very good year provided, of course, we do not become the "forgotten men" in the defense effort.

Wide World

ON FARAWAY BATTLEFIELDS the fight for a free world started in 1950. There, men and arms are the keys to victory.

1950—New Start for Coal

Problems Ahead Will Be Easier Because, in 1950, Coal...

Sought Long-Term Labor Peace
Built Grassroots Goodwill
Strengthened Its Markets
Girded Up for Defense Tasks
Realized on Research Gains
Broadened Use of New Machines

A YEAR FOR TAKING STOCK AND STARTING ANEW—that was 1950 in coal. It also was a year for girding up for the tasks ahead, whether they be the tasks of peace, which seemed doubtful; the tasks of a twilight zone between calm and conflict; or the tasks of global war.

With breathing time provided by the miners' return to work and a long-term wage agreement that settled some troublesome labor-relations issues, coal operators reassessed their position and made a new start.

Looking around, they saw a reassuring excess of capacity, with ability to produce up to 700,000,000 tons a year, if needed, by recalling idle mines and stretching out the work week to 40 or more hours.

Thanks to heavy investment in new properties during and since World War II, they saw their mines and plants in first-class operating condition, with over one-third of their tonnage produced by mines built within the last 10 yr. In 1950, 19 new bituminous deep mines of significant size were opened or placed in development, with total capacity of nearly 8,000,000 tons annually (261 days). Five good-sized new strip mines were reported in the year.

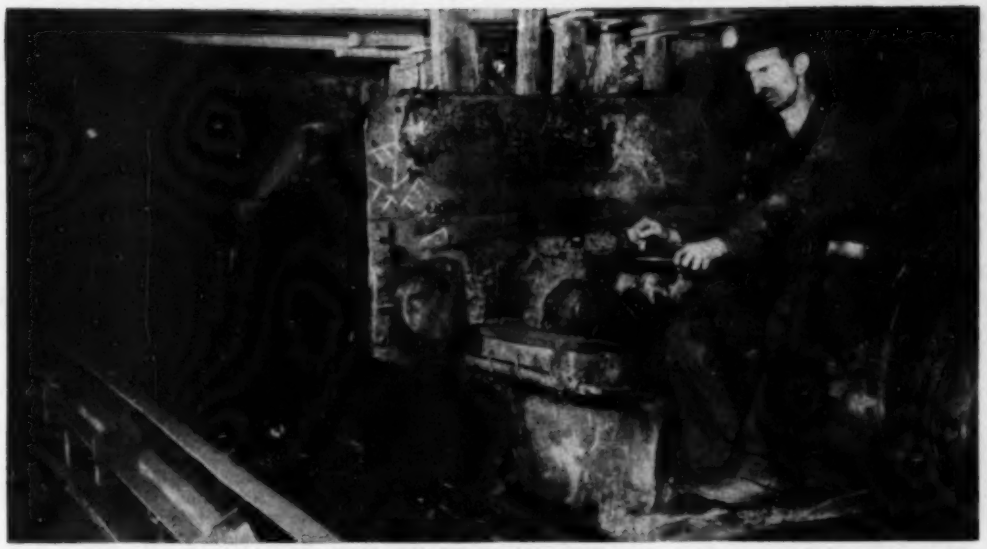
Thanks to additional machines and equipment and spreading acceptance of radically new units and methods, bituminous operators saw efficiency rise from 6.43 tons per man-day in 1949 to an estimated 6.75 in 1950; anthracite, from 2.87 to about 2.95.

Thanks to long training in the school of hard knocks, coal men saw their industry bounce back quickly after the mines started up again in March. In short, they saw an elastic industry, prepared to stretch with mounting defense needs. Bituminous output rose from 437,868,036 tons in 1949 to an estimated 506,000,000 in 1950; anthracite, from 42,701,724 tons to about 44,400,000.

Finally, thanks to their vision and courage, coal men saw growing strength in their programs for training, safety, merchandising, research and labor and public relations. Now, as in other times of crisis, they started a search for ways to assure needed materials and machines for uninterrupted production, adequate means for transportation and, if needed, fair distribution among coal's customers.

Competing Fuels And Coal Markets

A WIDE-OPEN ROAD for coal's competitors was laid down by the mine-workers' slowdown and stoppage in January and February and the months preceding. A tide of cheap imported oil along the At-



ON THE HOME FRONT the battle of production got under way. Here also, men and machines will win the fight.

lantic Seaboard, up to 1,000,000 bbl per day and selling for as low as $1.60 per bbl, did little to help coal's position.

As the year moved on, however, fuel prices sought their natural level and coal's competitive position improved. In September, the Bureau of Labor Statistics reported prices of petroleum products and distillate fuels up more than 10% above the same month in 1949 and residual fuels 25.4% higher. Bituminous, meanwhile, was up only 5% at retail and 1% at wholesale. In August, railroad coal was reported to be only 3.1% higher than in August, 1949. At the same time, field producers of natural gas were reported to be asking for increases ranging up to 15%.

Even so, though coal's markets firmed up, competition remained strong. Natural-gas pipelines fanned out and grew in all directions, with new lines to old and new markets, and with old lines growing in capacity. Utility sales of natural gas totaled an estimated 3,694,000,000 Mcf, up 19% above 1949. Near the end of the year, the Federal Power Commission authorized one company to pipe gas to New England, thus far a virgin market, and told another company it might build in New England when it could show adequate supplies. Seeking a way to avoid interruptible-service clauses in delivery contracts, two big nautral-gas companies spent $40,000,000 to enlarge storage capacity for service to the industrial East.

• **The oil industry,** meanwhile, produced an estimated 1,973,000,000 bbl of crude in 1950, up about 7.2% above 1949, and supplemented domestic output with big imports. Coal interests protested in Washington against the out-sized imports, but to little avail. The situation was made a little less harmful than it might have been by some electric utilities. These utilities, seeing it was to their advantage to keep coal competitive with oil, continued to burn coal.

Though the price of coal at the mine increased only slightly—bituminous, from $4.88 in 1949 to about $4.90 in 1950; anthracite, from $8.38 to about $8.76—the return of competitive pricing among fuels and adequate supplies of coal brought a welcome improvement in coal-company earnings after the dismal first quarter. A troublesome

How Coal Gained Strength, 1950 Over 1949

	1950 (Estimated)	1949	Per Cent Change
PRODUCTION:			
Anthracite, tons	44,400,000	42,701,724	+ 3.9
Bituminous, tons	506,000,000	437,868,036	+15.6
Crude oil, bbl	1,973,000,000	1,840,307,000	+ 7.2
SALES AND SHIPMENTS:			
Natural gas, Mcf	3,694,000,000	3,107,865,000	+18.8
Mfg. and mixed gas	572,000,000	563,099,000	+ 1.6
Liquefied petroleum gas, Mcf	9 940,000	10,408,000	— 4.5
Stokers, Classes I and II	18,500	29,311	—37.0
Residential oil burners and units	978,000	569,445	+71.7
RAILROAD FUEL:			
Coal, tons	55,000,000	68,123,000	—19.1
Liquid fuel, bbl	95,150,000	94,071,751	+ 1.1
ELECTRIC-UTILITY FUEL:			
Coal, tons	90,000,000	84,071,523	+ 7.1
Oil, bbl	82,000,000	66,302,548	+24.2
Gas, Mcf	640,000,000	549,888,635	+16.3

Sources: U. S. Bureau of Mines, American Gas Association, Department of Commerce, Interstate Commerce Commission and Federal Power Commission.

obstacle to coal was a shortage of gondola and hopper cars, reported to range up to 15,000 per week after July 1. This shortage could prove a real bottleneck, some operators predicted, if demand for coal surged upward. They were further disturbed, and prepared to fight, when the eastern railroads petitioned for a further boost in freight rates on coal—12c per net or 13c per gross ton.

• **Miners**—403,000 of them in bituminous and 76,000 in anthracite—shared better times as the strike ended. Weekly earnings of bituminous miners reached the year's low in January, with $47.36 for a 24.5-hr week; anthracite in February, with $40.23 for 20.6 hr. The high point came in March, with earnings in bituminous at $78.75 for 39.2 hr; anthracite, $80.01 for 41.5 hr. In September, weekly earnings in bituminous averaged $71.79 for 35.7 hr; anthracite, $69.04 for 34.8 hr. This compared favorably with earnings of factory workers, reported to average $60.68 in September.

• **In railroad motive power,** the trend continued against coal. In 1950, Class I roads burned an estimated 55,000,000 tons, 19.1% below 1949, while they increased their use of liquid fuels to an estimated 95,000,000 bbl, up a little over 1%. The true story of diesel growth, however, is revealed in a 29% increase in diesel-fuel consumption, while use of fuel oil and gasoline declined 14.2% and 32%, respectively. In November, the Association of American Railroads reported that of 1,523 locomotives on order on the first of the month, 1,496 were diesels, 19 were steamers and 8 were electric.

• **The electric utilities** remained the brightest spot in coal's outlook. They burned an estimated 90,000,000 tons in 1950 against 84,071,523 in 1949, an increase of 7.1%. The pickup was strong in the last quarter, averaging some 2,000,000 tons higher than in the same period in 1949. Some utilities with first-quarter ratios of 65% oil and 35% coal reversed their ratios as the year moved on.

Assuming competitive prices and good supplies, coal will remain the favored fuel for utilities and its use will grow along with the electric-power industry. About 10,000,000 kw of steam capacity started operating in 1950 or will start in 1951 and almost 9,000,000 kw is scheduled for delivery in 1952. *Power* reports that new steam central-station installations in the United States in 1950 totaled 96. Fifty of these are designed to burn coal exclusively and 30 to burn coal plus oil or gas or both.

• **Retail-wise,** bituminous lost a little ground in 1950 while anthracite picked up a little. Bituminous retail deliveries were about 85,000,000 tons against 90,299,000 in 1949. Anthracite gained nearly 2,000,000 tons to about 44,400,000, part of the recovery coming from reawakened markets in the Midwest. Residential stoker sales dropped from 29,311 units in 1949 to about 18,000, while sales of residential oil burners and units soared 71.7% to some 978,000. Home sales of natural gas rose to about 1,084,000,000 Mcf, a gain of over 18% above 1949, and domestic customers increased some 14% to approximately 14,000,000.

Labor Relations—The National Scene

ON THE LABOR FRONT, 1950 got off to a poor start, with the three-day and no-day week carrying over from 1949 while operators and the union continued their long tangle on contract issues. Mr. Lewis' request on Jan. 11 that the miners return to work seemed only to speed a growing stoppage. A week later, under mounting pressure from operators and public officials and a growing shortage of coal, the NLRB issued an unfair-labor-practices complaint against the union and Mr. Lewis, charging that the union's demand for union-shop and "able and willing" clauses were illegal and that the welfare fund discriminated against non-union workers.

When Mr. Lewis turned down President Truman's suggestion of an extra-legal fact-finding board, the President invoked the Taft-Hartley Act Feb. 6 and named a fact-finding board under terms of the law.

• **Negotiations** at last got under way. On Feb. 11, the fact-finders reported that the "issue of dollars and cents" was fundamental though obscured by "tactical maneuverings" on both sides. The board also rapped the union for failing to specify its demands. On the same day, miners began an all-out stoppage across the nation, defying an injunction issued Feb. 10 and ignoring Mr. Lewis' urgings to return to work.

On Feb. 16, Mr. Lewis revealed his demands. Two days later, the fact-finders reported that there still was a gap between the two parties. On Feb. 20, the union, but not Mr. Lewis, was ordered to show cause why it should not be cited for contempt. In the trial following the court's order, the government failed to prove its case. Immediately, the President asked Congress for seizure powers and for an investigation of the coal industry.

On Mar. 4, the fact-finding board announced substantial concessions on both sides and held out hope for an early agreement. This hope was fulfilled Mar. 6, with announcement of the following terms:

1. **Daily wage up 70c to $14.75.**
2. **Welfare-fund levy up 10c to 30c.**
3. **"Able and willing" clause abandoned.**
4. **Five-day-limit on "memorial" periods.**
5. **Union control of the welfare fund, with responsibility inferred.**
6. **Non-union employees eligible for welfare benefits.**
7. **The contract to run until June 30, 1952, with one reopening for wage adjustments after Mar. 31, 1951.**

Ten days later, anthracite operators signed a similar agreement.

With operators absorbing the lion's share of cost increases and with miners back at work, coal output quickly rose to 12,500,000 tons or more per week in bituminous; 1,200,000 tons in anthracite. The ICC cancelled its cutbacks in coal-burning rail service, steel mills fired up blast furnaces, schools and colleges reopened, retail coal merchants once more could take care of their customers, and coal users began to rebuild their stockpiles, which had shrunk to 26,000,000 tons or less. Coal production settled down to about 10,500,000 tons of bituminous and 1,000,000 tons of anthracite weekly.

• **But the damage** caused by the long struggle was not easy to repair. Red ink showed up in many first-quarter reports to stockholders. Investment in new equipment and new mines was delayed. Miners lost wages. Railroads lost revenues and sped up dieselization. Some utilities turned from single-fuel coal-burning equipment to multi-fuel boilers. Lots of home customers looked with more favor on oil and natural gas. Finally, coal's improving public relations suffered severe setbacks.

Not all was lost, however. Out of the long tangle came knowledge that strength can temper Mr. Lewis' victories. With that knowledge, a sizable group of Pennsylvania, Ohio and West Virginia producers

joined in the new Bituminous Coal Operators' Association and, in September, named Harry Moses, former president, H. C. Frick Coke Co., its leader. The new outfit, representing at the start about 150,000,000 tons and including six associations and 36 companies, set up an office in Washington and began its task of promoting, on a year-round basis, stability in labor relations.

In addition, the 28-mo contract spurred hope that coal might expect a stretch of peace. Though workers in other industries gained a fifth round of wage boosts in the fall, though the cost of living rose, and though it was freely predicted that Mr. Lewis soon would ask for more, he still had not been heard from at the year's end.

Labor Relations—The Local Scene

FAR FROM THE BARGAINING TABLE in Washington, the UMWA suffered some setbacks in the courts. As 1950 opened, an injunction forbade union interference at the Ozark-Philpott mine in Arkansas. Later, in October, the Arkansas Supreme Court upheld a contempt conviction after the union had continued its raids. In May, the NLRB complained against the UMWA and United Electric Coal Cos. in the case of a miner the company had dismissed at the union's demand. The miner's reinstatement, with back pay, was ordered in July. In the same month, the U. S. Court of Appeals ordered the UMWA to abandon the illegal union-shop clause in the "captive" contract. At the end of December, the NLRB found UMWA Districts 23 and 31, as well as the international organization, guilty of unfair labor practices in mass-invasion organizing campaigns in Kentucky and West Virginia in 1949.

• **The welfare fund's** rocky road during most of the year brought disappointment and inconvenience to many miners and their dependents in mining towns and elsewhere. In February, the courts refused to dismiss a suit by G. H. Livengood, former UMWA member in Pennsylvania, who asked for an accounting and restoration of welfare funds and a new set of trustees. In another case, a retired Kentucky miner sued for his pension, raising basic questions of welfare fund administration.

All payments from the welfare fund had been suspended in Sept., 1949. Some benefits were resumed after the new contract was signed. Finally, in mid-October, the new trustees—Miss Josephine Roche, fund administrator and "neutral" trustee; C. A. Owen, chairman, Imperial Coal Corp.; and Mr. Lewis—announced a revised schedule of disability and maintenance aids, with stress on rehabilitation of disabled men. Assistance to widows and dependent children was tightened up and a limited hospitalization and medical-care program was set up.

But hard feelings over the welfare fund and the work stoppage did not deter coal companies in their efforts to get along with their workers. Though a few companies suspended employees' magazines and cut out picnics and other celebrations in the first quarter, they resumed shortly after the strike.

Facts About Coal, 1949-1950

	1950*	1949†
ANTHRACITE:		
Tons per man per day	2.95	2.87
Value per ton, fob mine	$8.76†	$8.38
Employees	76,000	76,000
Mined by stripping, per cent	23.8‡	24.0
BITUMINOUS:		
Tons per man per day	6.75	6.43
Value per ton, fob mine	$4.90†	$4.88
Employees	403,000	406,000
Mined by stripping, per cent	22.4‡	24.2
Mechanically cleaned, per cent	35.8†	35.1
Stocks on hand, Dec. 31, tons	70,000,000	45,111,000

*Estimated. †Bureau of Mines. ‡Based on a year-end survey of state mining departments by *Keystone Coal Buyers' Manual*.

Building Up Public Relations

COAL-COMPANY HEADS in 1950 became increasingly aware that their local labor and community relations and their training programs are the grassroots source of public goodwill and confidence. Pursuing this line, to mention only a few instances, Union Pacific Coal Co., Rock Springs, Wyo., threw a big party for miners and their wives to mark safety achievements; Consumers Mining Co., Harmarville, Pa., staged an open house for miners, wives and neighbors at the new Dorseyville portal; Jewell Ridge Coal Corp., Tazewell, Va., gave a $10,000 dining hall to Boy Scouts; and The Philadelphia & Reading Coal & Iron Co., Pottsville, Pa., continued its strong program of worker-management-community information-sharing through leaflets, mailings and radio.

Elsewhere, the Missouri Coal Operators' Association staged two fishing contests, one for employees and the other for friends at large, to dramatize strip-land reclamation. And Jones & Laughlin Steel Corp. distributed $16,400 in savings arising from improved coal-mine safety among hospitals and other welfare agencies in the Vestaburg-Shannopin area of Pennsylvania.

• **In the grassroots movement,** especially in interpreting the big issues facing coal, some of the punch came from the National Coal Association. In February, spurred by the labor crisis, NCA and Bituminous Coal Institute at a special membership meeting urged individual companies to explain strike issues and other industry problems to the folks back home. Speech kits, newspaper mats and other materials were made available. Coal men, using these materials widely, reported favorable public reaction.

In this drive, as well as in other ways, BCI's Speakers' Bureau was active. With a roster of several hundred speakers on call, the Bureau was responsible for 371 speeches on coal to audiences totaling about 20,000 in 226 cities and towns in 31 states, plus the District of Columbia and Canada. The Bureau sponsored 40 speeches in Illinois alone. Subjects for speakers were coal in a war economy, union relations, safety, natural gas and free enterprise. The Bureau recently reported that in the 5 yr since its beginning, it has presented programs to 1,650 audiences totaling over 100,000 people.

• **Other BCI activities** included display booths at industrial exhibits and professional meetings; distribution of booklets on air pollution; wide circulation of two films on coal mining; correction of errors about coal in textbooks and encyclopedias; and distribution of printed materials among teachers and school children, women's clubs and other organizations.

Meanwhile, the Coal Producers' Committee for Smoke Abatement, backed up by new methods and devices perfected by Bituminous Coal Research, Inc., continued its drive to bring sanity to air-purification programs. In January, the group urged mayors of Kanawha Valley

towns to start a voluntary smoke-control plan and to review results annually. In May, the committee joined with BCR and the Lake Carriers' Association to set standards for fuel and burning methods for shipping on the Great Lakes. Also, the shipping interests and BCR approved further research on smoke at Battelle Memorial Institute. In November, the committee cited Columbus, Ohio, for a smoke-control plan that "had accomplished more, without uneconomical restrictions, than any other city."

To promote goodwill and strengthen anthracite's markets, Anthracite Institute in July announced a year-long $1,000,000 drive in newspapers and other media, plus exhibits at fairs, equipment shows and conventions. To this $1,000,000 was to be added $600,000 for research and other institute activities, plus another $1,000,000 that would be spent by individual companies for radio and television time and newspaper space. In September, the Institute added 16 more heating consultants to its field staff.

Seeking Better Ways To Sell More Coal

TO TRANSLATE GOODWILL into strong markets, anthracite and bituminous stepped up their marketing programs. As stated above, anthracite expected to spend $2,600,000 for this purpose. In addition, at least three new or improved anthracite burners, institute-approved, were announced in 1950. Individual companies, meanwhile, put new sparkle into their aids to retailers and conducted schools for anthracite and equipment salesmen.

On the bituminous side, Coal Heating Service Division, NCA, continued its joint program with retailers to promote bituminous coal, as well as burning equipment and controls. At the year's end, local CHS units totaled 78, with annual sales of 15,000,000 tons, serving 350 communities in 24 states. About 1,000,000,000 advertising messages were sponsored by CHS groups in newspapers, on bus cards and billboards, and on radio and television. Advertisements totaling 85,000 column-inches ran in over 100 newspapers with combined circulation of 10,000,000.

To back up this promotion, CHS retailers made wide use of the new Step-Up Sales Training Program, comprising films and textbooks on the art of salesmanship. They also conditioned a record number of heating plants, promoted wider use of budget plans for summer fill-ups, joined furniture and hardware dealers in pushing space-heater sales, and improved their delivery practices and equipment. All this added up to better-satisfied customers, new friends for coal and a strong position in the retail fuel market.

Advances in Coal Research

RESEARCH, like merchandising, was a strong weapon in coal's attack on its marketing problems. Anthracite Institute continued its search for better automatic burning equipment and, as stated above, put its approval stamp on at least three new or improved items of equipment. For the industrial market, anthracite sought better ways to make an economical producer gas and promoted wider farm uses, including tobacco-curing and production of alfalfa meal.

In bituminous, BCR, supported by about 40% of the Nation's commercial tonnage and a budget of $405,000, announced early in 1950 the completion of 72% of all projects undertaken since its beginning in 1934. The other 28% were started recently, are basic continuing projects or were abandoned because early studies were not encouraging. Of all projects started, 65% now are in some stage of production design, pilot-plant development, field testing or actual use. The year's milestones included the following, to mention only a few:

- **Residential heating**—First marketing of a magazine-type smokeless stove, with larger models on the way; also under development, an automatic bin-feed stoker with mechanical ash removal.
- **Industrial uses**—Improvements in steam locomotives; advance of producer-gas research to the point of pilot-plant design; study of cinder collection and smoke control for small plants; basic research in acid mine water and mine drainage; and continued study looking to a package-type automatic boiler for commercial and small industrial installation.
- **The Mining Development Committee** was authorized in June to go ahead for another 2 yr, with adequate funds subscribed. In 1950, this group, together with cooperating coal companies, designed a continuous face conveyor, reached final test stages on a stainless-steel belt conveyor and, in November, put an experimental model of its continuous miner on trial work in a mine.
- **A locomotive-size coal-burning** gas-turbine power plant was delivered early in the fall to the Locomotive Development Committee of BCR at Dunkirk, N. Y. At the end of the year, stationary tests within locomotive space limits were underway, with hope that the prototype locomotive would be on the rails in 1951.

Coal's biggest single-company research program, aimed by Pittsburgh Consolidation Coal Co. at gasification and liquefaction of coal and extraction of coal derivatives, was cut back early in the year because of higher mining costs, but the company continued its basic research. Meanwhile, in Missouri, Sinclair Coal Co. and the University of Missouri School of Mines made headway in electrocarbonization and gasification of coal underground. Underground gasification also continued at Gorgas, Ala., where the U. S. Bureau of Mines and Alabama Power Co. were engaged in a joint project.

The Alabama project was only one of the Bureau's many research activities. Others included gasification at Morgantown, W. Va., beneficiation of low-rank Western coals, and pilot-plant production of oil from coal at Louisiana, Mo. In Missouri, the hydrogenation plant was producing up to 300 bbl per day and the gas-synthesis pilot plant was nearing completion. In the course of the year, the Bureau also completed its $450,000 anthracite laboratory at Schuylkill Haven, Pa., and its $700,000 lignite-research laboratory at Grand Forks, N. D.

Coal-Mine Safety— New Record in 1950

A BIG STEP FORWARD in strengthening goodwill and labor relations lay in coal's improving safety record, the result of unending work on the national level by the Bureau of Mines and the Safety Division, NCA, and on the local level by state agencies, operator groups and individual companies and union locals. Admittedly, there still is a long way to go, but both industries, anthracite and bituminous, could look on 1950 as a banner year, even better than record-breaking 1949. As the year closed, bituminous had operated for 29 mo without a major mine explosion and for 26 mo without a major mine disaster.

- **Safety promotion** was aimed increasingly at the individual worker and his supervisor. The tools, as before, were posters, payroll safety messages, company magazines, let-

ters to foremen and miners, training classes in safety and supervision, safety and first-aid contests, underground crew meetings, and recognition of foremen and workers for their accomplishments. The key to the 1950 record lay in wider, wiser use of these tested tools and in better and safer equipment.

In May, the Safety Division, NCA, gave a luncheon in Washington, D. C., to over 60 mine foremen whose crews were known to have had no lost-time accident for 4 yr or more. The division also awarded certificates to over 1,000 foremen with one-year accident-free records. In October, the Division played a strong role with the Bureau of Mines and the mining departments of four states in staging a first-aid contest in Pittsburgh, with 16 teams from Pennsylvania, Ohio, Kentucky and West Virginia competing.

● **The Bureau sped its search** for safety by announcing in February that its 250 inspectors would investigate all fatal mine accidents and report to operators and state and union officials. Also, Bureau men taught widespread training classes for miners and supervisors. In Pennsylvania alone, for example, courses were completed or started at a total of 27 coal mines operated by 23 companies.

Elsewhere, individual companies and regional associations held safety meets and put on barbecues and banquets to honor their workers and foremen for safety progress.

Thus, with a new load in accidents and with a full-steam program of safety promotion under way on all fronts, the industry took on a new "it can be done" attitude toward safety and faced up to its labor- and public-relations problems without apology and with new courage and hope.

Training Young Men For Coal Mining

WITH BETTER SAFETY, good pay and opportunities for promotion, coal increased its efforts to draw young men to its ranks. In this drive, the NCA Committee on Vocational Training and Education promoted mining education in high schools and colleges. The committee met at various state universities —at Ohio State in January and at West Virginia in May. At these sessions, engineering-faculty members outlined their mining courses, traded ideas with the committee and sought ways to draw new students into engineering studies.

The committee's director, M. D. Cooper, traveled some 14,500 mi during 1950 and visited 31 colleges and 17 schools in the interest of the program. He and the committee chairman, H. C. Woods, chairman of the board, Sahara Coal Co., made speeches on coal and education before service clubs and other groups. At the year's end, they reported that 26 high schools in Kentucky, Ohio, West Virginia, Pennsylvania and Illinois were teaching mining courses to a total of 520 youngsters. The course in Illinois was offered for the first time in 1950.

On the college level, 108 mining scholarships were available—an increase of 12 over 1949. Out of 280 college graduates in mining engineering in 1950 in coal-producing states, 130 went to work in coal.

The University of Illinois Department of Mining & Metallurgical Engineering, with Illinois operators cooperating, held its third successful summer conference on careers in mining. About 35 high-school principals attended.

Elsewhere, Eastern Gas & Fuel Associates began providing coal-mining and coal-industry information to high schools near the company's mines in Pennsylvania, West Virginia and Kentucky. In May, high-school seniors from three counties in eastern Kentucky spent a day touring a modern mine under auspices of the Big Sandy-Elkhorn Coal Mining Institute. And in June, about 500 acres of coal land was given to West Virginia University, for lease but not for sale for 50 yr, to provide loans and scholarships for young men from mining families or mining communities.

How 1951 Looks

FACING UP TO 1951, coal men can be sure of plenty of work and no little trouble ahead. Mr. Lewis' shadow, as usual, lies across the future.

The magnitude of other troubles is not yet clear but, in greater or less degree, they will include higher prices for equipment and materials; scrambling for steel and copper; possible allocations and price ceilings; a manpower squeeze, perhaps with a job freeze and control of wages; transportation bottlenecks; and high taxes.

But, having survived troubles in years past, coal doubtless will survive those in store in 1951 and, indeed, may prosper. As the Nation moved toward a war footing, the Bituminous Coal Advisory Committee and the Coal Defense Committee kept government agencies well posted on the industry's needs. Toward the end of the year, coal was assured of able advocates in government when C. W. Connor, long in charge of coal operations for Armco Steel Corp., was named Solid Fuels Administrator, and E. T. Klett, Washington representative for Anthracite Institute, was made his deputy for anthracite. On Jan. 4, 1951, G. Don Sullivan, Ayrshire Collieries, was made special assistant to Mr. Connor.

● **On the manpower question,** though labor was getting tight (Peabody Coal Co., for example, reported that 79 of its men had been called into military service up to November), the draft was not likely to hit coal companies hard, since coal is basic to production of arms.

With bigger loads of military goods to haul, railroads already have recalled some steam power from retirement. That means, if not an increase in coal use in 1951, at least a halt in coal's decline in the railroad market.

Also, coal will ride the rising tide of electric-power and steel output, growing in part from defense needs and in part from population growth and higher living standards. Coal exporters and the producers who supply them probably can look for livelier business with Europe.

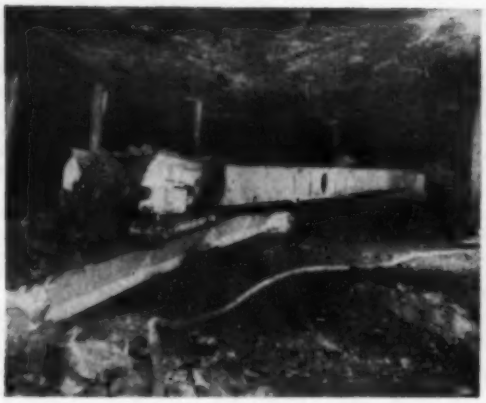
● **Industrial growth** is a big factor in coal's future. In the first quarter of 1951, American industry expects to spend $4,800,000,000 on new plants, new tools and general expansion, against $3,700,000,000 in the same period, 1950. Coal will provide fuel and power to fabricate materials and tools for these plants and much of the power to operate them after they are built.

Adding it all up, Appalachian Coals, Inc., recently came up with the following forecast for 1951:

How Much Bituminous in 1951?	
Steel	120,300,000
Utilities	108,000,000
Other industrials	118,000,000
Railroads	63,500,000
Retail deliveries	91,000,000
Exports, including Canada	40,000,000
Stocks	10,000,000
Total	550,800,000

Assuming the kind of weather the industry likes, anthracite should produce between 45,000,000 and 50,000,000 tons in 1951.

With those tonnage figures, 1951 can't be a bad year.



MINING AND STRIPPING PROGRESS in 1950 reflects growing use of more-efficient units for production, transportation and auxiliary operations, such as the bridge conveyor (left) in deep mining and the walking dragline (right) in strip mining.

Mining Progress in 1950

DEEP MINING—Continuous Mining Grows . . . Service Haulage and Auxilary Operations Improved

STRIPPING—Stripping, Loading and Haulage Efficiency Raised by Better Equipment and Methods

PREPARATION—Heavy-Media Increases . . . Fine-Coal Cleaning and Drying Stressed

NEW IDEAS in underground mining, stripping and preparation were numerous and far-reaching in 1950, making it one of the most active years of technical progress in the history of the industry.

Underground, major strides were made in the installation of continuous-mining equipment, with the big auger looming larger in the picture. In addition, progress was made in solving the vexing problem of transportation behind face equipment, particularly of the continuous-mining type. Pitch-mining developments were marked by increased activity in drilling and shooting pillars.

Stripping progress was again characterized by a further increase in the use of big augers and other equipment for increasing coal recovery after the stripping limit had been reached. Major progress also was made in drilling overburden and in improving equipment for hauling both coal and spoil.

Fine coal was stressed again in preparation in 1950, with the flotation machine and the cyclone coming more and more to the front, along with new heavy-medium and new air-cleaning equipment for both coarse and fine sizes. The coal-washing table again went into numerous bituminous and anthracite plants, while drying was marked by the design or introduction of new units of both the mechanical and thermal types.

DEEP MINING

ALTHOUGH 1950 was an active year for new ideas and new equipment, much of the work in mining improvement was along already well-explored lines. Thus, standard loading machines and conveyors were installed in substantial numbers, with emphasis on the trackless types of loading machines. This was accompanied by corresponding activity in new and higher-capacity cutters and drills, including flexible-shaft-powered units; alloy and carbide-tipped bits; multiple shooting with permissible explosives; wider use of air for breaking coal; and so on.

Continuing stress also was laid on big shuttle cars and mine cars with automatic couplers and steel wheels; automatic car- and trip-handling equipment; heavier track with automatic switching and trip-control equipment; trolleyphone and radio communication; belt slopes and belt main lines; new shuttle-car and loader carriers; tractor-trailer supply, equipment and personnel carriers; sprinkling and other dust-control methods and equipment; improved ventilating equipment and facilities, including core-drilled shafts for air and emergency escape; modern pumping equipment with emphasis on deep-well-turbine units; plastic and other corrosion-resisting pipe; automatic pump, substation and fan controls; rectifiers, non-inflammable transformers and modern sectionalizing and distribution equipment for electric power; improved ground protection for both men and equipment; steel tunnel and shaft lining; prefabricated steel buildings; modern underground and surface shops and supply depots with labor-saving equipment; improved lubricating equipment and lubricants; anti-friction bearings; and wider use of corrosion- and abrasion-resisting materials and longer-lived insulating materials.

New developments in deep mining in 1950 included the following:

FINE-COAL RECOVERY AND CLEANING was emphasized in preparation progress in 1950, along with heavy-media and heat and mechanical drying.

● **Continuous Mining**—With additional experience, continuous mining strengthened its position. Production records of 50 tons per man or better in the working sections were reported—as good or better than the outstanding records for conventional loading units. Details on several new machines were released, including one depending upon resonance set up by hammers to break down the coal. In addition, the principle of cutting down rather than up was employed in an increasing number of instances. And along with everything else, major progress was made toward commercial production of machines for coal as thin as 30 in.

● **Auger Mining**—While the number of installations was small, a definite start was made on augering underground, with some companies planning entire new mines based on augering for the major part of the production. Developments included the installation at one operation of a machine designed to work both ways from the same opening and, it is planned, to be modified to bore both above and below a parting simultaneously.

● **Pitch Developments**—Mining of pillars in the anthracite region by drilling and shooting was the subject of increased experimental work in 1950. In the Far West, a new boring unit was proving successful in drilling crosscuts and return airways, with a substantial saving in cost. It also was felt that it could be applied to production by drilling long chutes, then using a small-diameter machine to drill holes in the intervening pillars, which would be shot out in sections starting at the top.

● **Service Haulage**—Major developments in transporting coal behind loading machines and continuous miners included the following:

1. Advent of the bridge conveyor, providing a permanent connection between loading or mining unit and room conveyor, followed by widespread interest and active installation in additional mines.

2. The cascade-conveyor system of serving continuous miners received new adherents in 1950, with one using a combination of cascade conveyors and shuttle cars. In medium-height coal, this latter operation was averaging up to 50 tons per man on the continuous-miner sections and expected to do substantially better.

3. New types of conveyors for room and other service included: (a) a jigging steel-belt unit with reel storage for rapid extension and retraction; a belt unit moving back and forth on a carriage suspended from the roof; another belt unit capable of operating while curved; and a chain-type mother conveyor on wheels for rapid moving without dismantling. All were reported to be in regular operation or under test.

● **Belt Haulage**—One operation solved the problem of overloading and delays where section belts feed to a main-line unit by installing a surge hopper with a chain-and-flight feeder conveyor in the bottom. The same operation also pioneered a simplified belt-conveyor control using two bare wires and operating on 3 instead of 20 to 30 v. The conveyor can be started, stopped and locked out from the two wires.

● **Car and Trip Handling**—At least two new units for handling cars at belt and other transfer stations without loss of time proved their merits in 1950. One, with two hydraulic rams for car feeding, includes a remote power unit. The other, using a chain with reversing sprocket to advance and retract two dogs, on each end of the chain with the sprocket in the center, is powered through a universal joint from a trackside drive. Both are designed for center-of-the-track installation.

● **Sequence Air Breaking**—A new air control developed at a Middle-Western property permits placing three air-breaking cartridges and then discharging them in sequence without returning to the face.

● **Roof Support**—Bolting made rapid strides in 1950. In addition, it was being increasingly used on ribs and, according to reports, also was being applied to prevent heaving of bottom.

The year also brought what was probably the first full-scale adaptation of roof-bolting to the production cycle, as well as growing installation of central compressor stations to increase drilling efficiency. Where wooden pins are used, experiments were under way with grouting them into place.

In drilling for roof bolting, the emphasis was on rotary-type units designed, also for quick application of the nut. Where holes must be substantially deeper than seam height, some companies were working on special types of bolts, including the telescopic, or bolt-within-a-bolt, type.

Development of dust collectors ranged from light-weight units of the injector-suction type on air legs to separate rubber-mounted units with suction fans, cyclone collectors and filter bags. At the same time, activity in the use of water continued, with at least one company reporting excellent results from a system worked out for rotary drilling.

● **Power and Electrification**—Developments in mine power and electrification included tests of the short-circuiting contactor as an electrical-protective device for men and equipment; discussion of combination diesel-battery units for shuttle cars; increased use of air-cooled or sealed gas-filled transformers; equipping of conversion units with rubber tires for portability in trackless mining; wider use of the inverted

trolley; first use of the selenium rectifier for shuttle-car power; installation of combination battery-trolley tractors for supply and personnel handling; automatic electrical equipment for trimming and spotting mine cars; wider use of hydraulic power in practically all mining applications; and growing consideration of the possibilities of ac for underground operations.

• **Maintenance**—Development of on-the-section rubber-tire-mounted cable-repair and vulcanizing units marked a long step toward better cable maintenance in 1950. Application of centralized system to continuous-mining units marked lubrication developments, while advances in materials included wider use of rubber in pinch valves, increased use of orifice-type valves in lines handling solids, and employment of silicon-carbide particles in a special cement to coat the wearing surfaces of pumps and other equipment.

• **Plastic Sealing**—The use of vinyl plastic got off to a major start in 1950, not only in rendering existing stoppings air tight but in the low-cost construction of new temporary and permanent stoppings. In addition, it was widely used in stopping repair and was being applied to roof and ribs to prevent sloughing.

STRIPPING

WITH STRIPPING again producing its share of the anthracite and bituminous tonnage, emphasis again was on higher-capacity equipment better adapted to an increased production rate or to thicker overburden.

As in the past, disposal by casting was the goal in handling overburden wherever possible. However, thicker material and the development of better haulage equipment was responsible for an increase in spoil haulage. This was particularly true in anthracite, where there was increasing emphasis on deep stripping of large areas involving major spoil-trucking operations and backfilling.

A further increase in the use of large walking draglines and in higher-lift longer-range fronts on both large and small shovels—particularly the latter—was registered in 1950. Because of the need for extra capacity, better utilization of manpower, and better ability to cope with thicker material, such auxiliaries as scrapers, wheel excavators and big bulldozers were used in larger numbers. In fact, the number of operations relying largely or completely on bulldozers and scrapers showed another gain, in part reflecting the increased power and capacity of the tractor equipment available in 1950.

• **Stripping and Spoil-Handling**—Although strippers generally continued to employ conventional methods and equipment in 1950, there was considerable thought devoted to new ideas for handling overburden. One was a combination crusher and stacker belt large enough to handle a 50-yd dipper

New Bituminous Preparation Facilities in 1950*

Coal Company	Plant Location	Capacity, Net Tons of Feed per Hour	Preparation Equipment
ABC Coal Co.	Jasonville, Ind.	150	Templeton-Matthews
Alabama By-Products Corp.	Praco, Ala.	50	Western Machinery[1]
Armco Steel Corp.	Montcoal, W. Va.	60	Heyl & Patterson[2]
Barbara Kay Coal Co.	Marion, Ill.	15	Deister Concentrator[3]
Barnes & Tucker Coal Co.	Bakerton, Pa.	215	Roberts & Schaefer[4]
Barnes-Dawson Coal Co.	Dawson, W. Va.	450	Roberts & Schaefer
Beech Knob Coal Co.	Clearco, W. Va.	40	Kanawha
Bethlehem Collieries Corp.	Idamay, W. Va.	200	Roberts & Schaefer[4] Jeffrey[5]
Bird Coal Co.	Johnstown, Pa. (2)	180	Roberts & Schaefer[4]
Black Prince Coal Co.	Centralia, Wash.	15	Deister Concentrator[3]
Bluestone Coal Co.	Bluestone, W. Va.	100	Roberts & Schaefer[4]
Boone County Coal Corp.	Moncio, W. Va.	90	McNally-Pittsburgh[6]
Buckeye Coal Co.	Nemacolin, Pa. (26)	750	Nelson L. Davis[7] Deister Concentrator[3] Denver Equipment[8]
Cambria-Clearfield Mining Co.	St. Benedict, Pa.	60	Kanawha[11]
Cannelton Coal & Coke Co.	Cannelton, W. Va.	450	Kanawha[11] Jeffrey[10]
Carnegie-Illinois Steel Corp.	Clairton, Pa.	90	Heyl & Patterson[2]
Carrs Fork Coal Co.	Allock, Ky.	150	Jeffrey[10]
Cherokee Coal Co.	Danville, Ill.	15	Deister Concentrator[3]
Chicago, Wilmington & Franklin Coal Co.	W. Frankfort, Ill. (2)	340	Allen & Garcia[11] Jeffrey[11]
Christian Colliery Co.	Mahan, W. Va.	200	Kanawha[11] Jeffrey[10]
Christopher Coal Co.	Morgantown, W. Va.	5	Deister Concentrator[3]
Clean Coal Co.	Bellaire, Ohio	100	Jeffrey[5]
Clear Fork Coal Co.	Fonde, Ky. (2)	20	Deister Concentrator[3]
Clinchfield Coal Corp.	Moss, Va. Clinchco, Va. Dante, Va.	200 60 80	Fairmont[12] Kanawha[11] Roberts & Schaefer[4]
C. A. Clyborne, Inc.	Bluefield, W. Va.	75	Jeffrey[10]
Colorado Fuel & Iron Corp.	Weston, Colo.	250	McNally-Pittsburg[13]
Consolidation Coal Co.	Stringer, W. Va.	450	Fairmont[14]
Crystal Block Coal & Coke Co.	Rawl, W. Va.	300	Southwestern Eng.[15]
DeBardeleben Coal Corp.	Sipsey, Ala. (2)	30	Deister Concentrator[3]
Deseret Coal Co.	Orangeville, Utah	100	McNally-Pittsburg
Dakota Collieries Corp.	Zap, N. D.	340	McNally-Pittsburg
Enos Coal Mining Co.	Enosville, Ind.	300 160	Link-Belt[16] McNally-Pittsburg[17]
Freebrook Corp.	Ringgold, Pa.	80	Roberts & Schaefer[18]
Freeman Coal Mining Corp.	Farmersville, Ill.	800	Roberts & Schaefer[19] Jeffrey[10] Link-Belt[20]
Gasten Coal Co.	Alpoca, W. Va.	45	Roberts & Schaefer[4]
Glenn Brook Coal Co.	Weirton, W. Va.	70	Jeffrey[5]
Gulf Mining Co.	Crab Orch., W. Va.	60	Kanawha[11]
Gulf Smokeless Coal Co.	Tams, W. Va.	400	Fairmont[21]
Halliday boro Coal Co.	Elkville, Ind. (2)	120	Western Machinery[22]
Hanna Coal Co.	Georgetown, Ohio (29)	232	Deister Concentrator[3]
Hart & Hart Coal Co.	Providence, Ky. Providence, Ky. (3)	150 30	Western Machinery[1] Deister Concentrator[3]
Hitchman Coal & Coke Co.	Zellenople, Pa.	150	Jeffrey[10]
Jamison Coal & Coke Co.	Hostetter, Pa.	... 600 300	Ind. Eng. & Const. Jeffrey[5] Robt. Holmes[23]
Jewell Ridge Coal Corp.	Jewell, Va.	60	Kanawha[11]
Johnstown Coal & Coke Co.	Bellburn, W. Va.	60	Kanawha[11]
Jones & Heatherman Coal Co.	Peach Creek, W. Va.	250	McNally-Pittsburg
Ken Coal Co.	Beaver Dam, Ky.	500	McNally-Pittsburg[13]
Knife River Coal Mining Co.	Gascoyne, N. D.	300	Link-Belt
Linton-Summit Coal Co.	Sullivan, Ind. (6)	120	Templeton-Matthews[9] Deister Concentrator[3]
Lion Coal Corp.	Wattis, Utah	70	Roberts & Schaefer[4]
Livingston-Mt. Olive Coal Co.	Livingston, Ill.	60	Western Machinery[1]
Lone Star Coal Co.	Fontanet, Ind.	40	Western Machinery[22]
Lumaghi Coal Co.	Collinsville, Ill.	300	Templeton-Matthews[9] Jeffrey[5]
MacAlpin Coal Co.	McAlpin, W. Va.	140	Kanawha[11]
Marriott-Reed Coal Co.	Columbia, Mo.	125	McNally-Pittsburg[24]
Meadows Coal Co.	Dawson Springs, Ky.	125	Roberts & Schaefer[4]
Mid-Continent Coal Corp.	Marissa, Ill. (2)	20	Deister Concentrator[3]
Middle Fork Coal Co.	Paintsville, Ky.	75	McNally-Pittsburg[6]
Moore & Son Coal Co.	Marion, Ill.	15	Deister Concentrator[3]

New Bituminous Preparation Facilities in 1950*

Coal Company	Plant Location	Capacity, Net Tons of Feed per Hour	Preparation Equipment
Morgan Mines, Inc.	Edwards, Ill.	40	McNally, Pittsburg[20]
New Big Creek Mining Co.	Manchester, Ky.	150	Jeffrey[4]
Northwestern Improvement Co.	Roslyn, Wash.	35	Vissac[26]
Old Ben Coal Corp.	Valier, Ill.	860	McNally-Pittsburg[27]
Penn Valley Mining Co.	Hunker, Pa.	80	Kanawha[11]
Peters Creek Coal Co.	Summerville, W. Va.	60	Roberts & Schaefer[4]
Pickands, Mather & Co.	Mather, Pa. (4)	24	Deister Concentrator[5]
Pittsburg & Midway Coal Mining Co.	Hallowell, Kan.	500	McNally-Pittsburg[20]
Powell Coal Co.	Kittanning, Pa. (2)	140	Western Machinery[28]
Princess Elkhorn Coal Co.	David, Ky.	35	Robt. Holmes[29]
Red Jacket Coal Corp.	Coal Mtn., W. Va.	40	Roberts & Schaefer[4]
Red Parrot Coal Co.	Pranter, W. Va.	80	Kanawha[30]
Ridgeview Coal Co.	Ridgeview, W. Va.	110	Kanawha[30]
Riverview Coal Co.	Hartford, Ky.	250	McNally-Pittsburg
Rose Hill Coal Co.	Roseville, Ohio	100	Prins[31]
Saginaw Dock & Terminal Co.	St. Clairsville, Ohio	100	Nelson L. Davis[32]
Saxton Coal Corp.	Petersburg, Ind.	220	Templeton-Matthews[33] Kanawha[11]
Smith Coal Co.	Combs, Ky.	150	Roberts & Schaefer[34]
Sunnyhill Coal Co.	New Lexington, O. (4)	...	Prins[31]
Templeton Coal Co.	Sullivan, Ind. (6)	120	Templeton-Matthews[3] Deister Concentrator[5]
Trotter Coal Co.	Cassville, W. Va.	...	Interstate
	Cassville, W. Va. (5)	50	Deister Concentrator[5]
	Cassville, W. Va.	150	Jeffrey[35]
Truax-Traer Coal Co.	Ceredo, W. Va.	50	Heyl & Patterson[36]
	Flatt, Ill.	1,250	McNally-Pittsburg[37]
Weirton Steel Corp.	Weirton, W. Va.	225	Jeffrey[4]
West Kentucky Coal Co.	Madisonville, Ky. (3)	100	Link-Belt[38]
	Madisonville, Ky.	35	Jeffrey[39]
Westmoreland Mining Co.	White, Pa.	60	Robt. Holmes[29]
Wyatt Coal Co.	Sharon, W. Va.	100	Kanawha[11]
Yates Coal Co.	Coalton Ky.	70	McNally-Pittsburg[2]
Youghigheny & Ohio Coal Co.	Glen Robbins, O. (11)	100	Deister Concentrator[40] Heyl & Patterson[36]
	Van, W. Va.	120	Heyl & Patterson[37]

*Includes additions and installations of new preparation facilities in existing structures. Where more than one unit was installed in a plant, the number, when available, is shown in parentheses after the plant address.

1. WEMCO Mobil-Mill cleaning equipment, including WEMCO drum separators. 2. Cyclone thickeners, vacuum filter and auxiliaries. 3. SuperDuty No. 7 Diagonal-Deck tables with Concenco revolving feed distributors as follows: Hanna, 6; Pickands Mather, 1; Linton-Summit, 1; Templeton, 1; Trotter, 1; Youghigheny & Ohio, 1. 4. R&S Super-Airflow cleaning equipment. 5. Including Jeffrey Baum-jig and Bird-centrifugal equipment.

6. Unit washer. 7. R&S Hydroseparator equipment. 8. Including two NELDCO heavy-media processors, 450 tph; six SuperDuty tables, 50 tph; and 12 Denver Sub A flotation cells, 45 tph; plus automatic samplers and auxiliary equipment. 9. Including Jeffrey Baum-jig equipment. 10. Stoker plant.

11. Including Kanawha-Belknap chloride washing equipment. 12. Fine-coal plant using SuperDuty tables. 13. Including Bradford breaker. 14. Including Chance heavy-density cone, SuperDuty tables and centrifugal and thermal driers. 15. Including SWECO heavy-media separation equipment and Akins classifier.

16. Link-Belt air-pulsated wash box. 17. McNally Rheo fine-coal launder. 18. R&S Hydrotator equipment. 19. Including Jeffrey Baum-jig, R&S Super-Airflow cleaners and Link-Belt Multi-Louvre drying equipment. 20. Including Chance heavy-density equipment.

21. WEMCO Mobil-Mill cleaning equipment. 22. Diaphragm-jig equipment. 23. Baughman Verti-Vane drying equipment. 24. Including McNally Norton automatic washing equipment. 25. McNally Norton rewashing unit.

26. Vissac Pulso updraft drier. 27. Including five McNally Tromp automatic dense-media baths, McNally Rheo launder system and McNally Carpenter centrifugal driers. 28. Including two McNally Norton automatic washers, McNally Rheo launders and McNally Carpenter centrifugal driers. 29. Prins package-type unit washer and "Streamcleaner." 30. "Packaged-unit" heavy-media float-and-sink plant.

31. Including Jeffrey Baum-jig and C-M-I driers. 32. Hydrotator and Super-Airflow cleaning equipment. 33. Two manifolds cyclone separators recovering 1/8x0 from 1,800 gpm water. 34. Including raw-coal facilities, McNally Norton automatic washers and McNally Carpenter centrifugal driers. 35. Link-Belt Multi-Louvre driers.

36. Fine-coal plant, including seven SuperDuty tables, revolving feed distributor, Heyl & Patterson thermal drier, Heyl & Patterson cyclone thickener, and vacuum filter. 37. Fine-coal preparation plant with thermal drying. 38. Including Bradford breaker, 400-ton concrete stave silo and Jeffrey unit washer, 80 tph. 39. Sludge-drying plant including C-M-I drier. 40. Including McNally Norton unit washer. 41. Prins "Streamcleaner."

load. Rubber-tired trains for hauling spoil was another suggestion, along with new units for digging spoil out of the solid without drilling and shooting. Meantime, in addition to standard truck equipment, spoil-haulage activity in 1950 was marked by the development of rubber-tired rock wagons up to 50 tons or more in capacity and able to dump to either side without stopping.

Parallel-tandem operation was a new starter in the field of stripping methods in 1950. It is based on a dragline on the bank with a shovel in the pit, with complete loading of the coal and, as a result, alternate stripping and loading in the two halves of the pit.

• **Auger Mining**—Auger mining from strip pits showed a major increase in 1950. Operation with 5-ft-diameter equipment showed that the previous drilling limit of approximately 100 ft could be extended to 150. Tons per man on the crew remained at approximately 200.

• **Development**—Aerial mapping in planning stripping development showed a major increase in 1950.

• **Double-Shift Loading**—At least two major strip operations in 1950 were loading two shifts, and in both instances were able to get the extra tonnage with no increase in stripping equipment.

For drilling coal prior to loading, one operation proved the advantages of a self-propelled drilling unit with integral compressor.

• **Overburden Preparation**—Developments in drilling overburden in 1950 included a new vertical drill using a dry-type rotary bit. Preliminary results indicate that footage per drill shaft is increased up to 300% in overburden, including little or no sandstone. Bit life ranges from 2,000 ft where sandstone has been encountered up to 8,000 ft in favorable material.

Continued success with the original stemming machine for horizontal holes was responsible for plans for additional installations in 1950.

• **Haulage**—More powerful engines and bigger units were the outstanding advances in strip haulage in 1950, along with growing use of torque-converter drives. The latter, experience indicates, materially reduce truck maintenance, while fuel consumption is increased only nominally if at all. Such drives also were widely used on tractors. There also was a further growth in the use of straight trucks with independent hoists for dumping.

In the engine field, 1950 marked the proving of a 400-hp diesel unit in a tractor pulling a 70-ton semi-trailer. With torque-converter transmission, preliminary results indicate a substantial saving per ton-mile.

The stepped haulage road specifically designed for preventing overspeeding down and long hauls in lower gears up was adopted by at least one stripping company in 1950, with others planning its use.

• **Auxiliary Progress**—Developments in auxiliary operations around strip mines in 1950 included: consideration of the pos-

New Anthracite Preparation Facilities in 1950*

Coal Company	Plant Location	Capacity, Net Tons of Feed per Hour	Preparation Equipment
Auburn Coal Co.	Auburn, Pa. (7)	56	Deister Conc.[1]
Beaver Brook Coal Co.	Beaver Brook, Pa.	35	Wilmot[2]
Blackwood Const. & Supply Co.	Mt. Carmel, Pa. (3)	210	Menzies[3]
Celtz Coal Co.	Pottsville, Pa. (3)	135	Wilmot[2]
Consagra Coal Co.	Blakely, Pa. (3)	28	Menzies[3]
	Blakely, Pa.	20	Wilmot[2]
D. & B. Coal Co.	Buck Run, Pa. (2)	30	Wilmot[2]
Di Renzo Coal Co.	Llewellyn, Pa. (2)	30	Wilmot[2]
Glen Alden Coal Co.	Scranton, Pa. (3)	210	Menzies[3]
Haven Coal & Supply Co.	Sch. Haven, Pa.	10	Deister Conc.[1]
Hillside Coal Co.	So. Tamaqua, Pa.	18	Wilmot[2]
Leon Kocher Coal Co.	Valley View, Pa. (2)	14	Menzies[3]
Legal Coal Co.	Goodspring Pa.	12	Menzies[3]
Lehigh Navigation Coal Co.	Coaldale, Pa. (3)	165	Wilmot[2]
	Coaldale, Pa. (3)	30	Deister Conc.[1]
	Lansford, Pa.	80	Wilmot[2]
	Tamaqua, Pa. (2)	115	Wilmot[2]
	Tamaqua, Pa. (2)	10	Deister Conc.[1]
Lehigh Valley Coal Co.	Wilkes-Barre, Pa.	100	Wilmot[2]
Mammoth Coal Co.	Raven Run, Pa.	30	Menzie[4]
	Raven Run, Pa.	110	Menzies[3]
No. 9 Coal Co.	Pittston, Pa.	200	Menzies[3]
Harry J. O'Brien	Suedberg, Pa.	7	Menzies[3]
Penna Coal Co.	Mineraville, Pa. (2)	38	Wilmot[2]
Pompey Coal Co.	Jessup, Pa. (2)	45	Wilmot[2]
Racket Brook Coal Co.	Carbondale, Pa. (2)	33	Wilmot[2]
Rhoads Contracting Co.	Ashland, Pa. (3)	190	Wilmot[2]
Rosini Bros.	Shamokin, Pa. (2)	18	Deister Conc.[1]
Savitski Bros.	Atlas, Pa.	18	Wilmot[2]
Schrader Coal Co.	Mineraville, Pa.	40	Wilmot[2]
Stevens Coal Co.	Treverton, Pa. (4)	40	Deister Conc.[1]
Susquehanna Collieries Div.	Shamokin, Pa.	80	Wilmot[2]
Valley View Coal Co.	Pittston, Pa.	170	Western Mach.[5]

*Includes contracts for installation of new preparation equipment in existing structures. Where more than one equipment was installed, the number, when available, appears in parenthesis.

1. SuperDuty No. 7 Diagonal Deck tables with Concenco revolving feed distributors as follows: Auburn, 1; Haven, 1; Lehigh Navigation (Coaldale), 1. 2. Hydrotator cleaning equipment. 3. Menzies cone-separator equipment. 4. Simplex-jig equipment. 5. Hydrotator and Hydrotator-classifier equipment. 6. Menzies cone with oil-flotation. 7. Hydrotator and Hydrotator-classifier oil-flotation equipment. 8. WEMCO Mobil-Mill cleaning unit including WEMCO drum separator.

sibility of 6,000 v for stripping equipment; wider use of the derived-neutral ground in 440-v service; increased installation of frequency-modulation radio and carrier-current phones; more quick-coupling plastic and aluminum pipe; and wider use of truck-mounted field-service units.

● **Reclamation**—Increased emphasis was placed on all phases of spoil reclamation and land improvement in 1950, with special attention to leveling in many areas in preparation for cattle grazing. Special plans were suggested for surface restoration with scraper stripping.

PREPARATION

FINE-COAL CLEANING again received the major emphasis in preparation developments in 1950, which also were marked by a major increase in the use of heavy-media cleaning equipment, flotation machines, coal-washing tables, cyclones, and mechanical and heat driers for both coarse and fine coal. A new-type air cleaner received its field trials in 1950 and a heavy-medium process from abroad was scheduled for installation.

● **Coarse-Coal Cleaning**—Heavy-medium or heavy-density equipment registered wide gains in coarse-coal cleaning in 1950, though the jig and upward-current units maintained their lead. The top size normally cleaned remained at about 6 in, though some heavy-medium and other units were designed for 7 in, and as high as 10 in was being considered. Rotary breakers were increasingly employed for preliminary cleaning and top-size reduction. Blending facilities staged another increase, particularly at coking-coal plants.

● **Fine-Coal Cleaning**—Emphasis in both the anthracite and bituminous industries, as previously noted, was on fine-coal cleaning. As a result, a substantial number of units were installed for cleaning buckwheat and smaller—including No. 5—in the anthracite region, and ½ in or less at bituminous mines. Tables and special upward-current washers and classifiers were widely installed, along with special jigs, heavy-medium units and flotation machines.

The cyclone with heavy medium also was discussed as a fine-coal cleaner, while air-cleaning units staged a major comeback in this field, as well as in coarser cleaning up to 1½ to 2 in. Several coal-washing tables also were installed for coal up to 1¼ or 1½ in. To permit handling coals with higher refuse content, two table installations in 1950 were equipped with vented backboards, thus increasing refuse-discharge ability up to 100% of the feed. Excellent results are reported. Backboard venting also increases the ability of the tables to handle variations in refuse content efficiently.

● **Retreatment**—Although the total number was not great, there was a substantial increase in the use of cleaning units for retreating middlings and refuse in 1950. Units contracted for included tables and heavy-medium equipment.

● **Drying**—Both mechanical and heat drying were increasingly incorporated into preparation flowsheets in 1950, with especial attention to cyclone-type thickeners and disk, vacuum and solid-bowl centrifugal filters for final polishing and closing of the circuit. A by-product in the latter instance, even where the fines were not salable, was keeping them out of settling ponds and streams. Desliming prior to centrifuging, and centrifuging prior to heat drying, were increasingly the trend.

New heat driers under development during the year included a fluidized-bed unit for which an efficiency of 75 to 85% is expected.

● **Sizing**—Vibrating screens continued in the forefront in sizing, as well as in dewatering. The number of special stoker-coal crushers and stoker plants increased, along with other prescription mixing and blending. Dust-proofing again found oil well in the lead. For loading, a new development was a shuttle belt on a trackside trestle to permit loading a number of cars without moving them. For unloading railroad cars, there was a major increase in the use of shakers.

● **Refuse Disposal**—Along with normal activity in the refuse-disposal field in 1950, much attention was devoted to preventing and extinguishing gob fires. New methods of piling and compacting refuse, and of sealing exposed edges, were developed.

Loader and Cleaner Sales

Coal Mechanically Loaded and Cleaned Marked Up Slight Percentage Gains in 1950 While Sales of Loading Equipment Dropped 20.6% and Capacity of New Cleaning Equipment Declined 8%.

By W. H. YOUNG, Chief, Bituminous Coal Section, and R. L. ANDERSON, Engineer-Economist, U. S. Bureau of Mines, Washington, D. C.

Table I—United States Bituminous and Lignite Production by Methods of Mining and Mechanical Cleaning

	1948 Thousands of Net Tons	1948 Percent of Total	1949 Thousands of Net Tons	1949 Percent of Total	1950* Thousands of Net Tons	1950* Percent of Total
Surface stripping	130,506	23.3	106,043	24.2	122,000	24.1
Hand-loaded underground	154,206	27.4	109,447	25.0	118,000	23.3
Mechanically loaded underground	295,806	49.3	222,376	50.8	266,000	52.6
Total production	599,518	100.0	437,868	100.0	506,000	100.0
Mechanically cleaned	180,880	30.2	153,652	35.1	181,000	35.8

*Preliminary.

Table II—Underground Bituminous and Lignite Production, by Methods of Loading

	1948 Thousands of Net Tons	1948 Percent of Total	1949 Thousands of Net Tons	1949 Percent of Total	1950* Thousands of Net Tons	1950* Percent of Total
Loaded by machines†	253,044	55.0	191,572	57.7	...‡	...‡
Handled by conveyors§	42,762	9.3	30,804	9.3	...‡	...‡
Total mechanically loaded	295,806	64.3	222,376	67.0	266,000	69.3
Hand-loaded	164,206	35.7	109,447	33.0	118,000	30.7
Total underground production	460,012	100.0	331,823	100.0	384,000	100.0

*Preliminary. †Includes mobile loaders, continuous miners and conveyors equipped with duckbills or other self-loading heads. ‡Included under "Total mechanically loaded." §Includes hand-loaded conveyors and pit-car loaders.

Table III—Units of Mechanical Loading Equipment Sold to Bituminous, Anthracite and Lignite Mines As Reported by Manufacturers

	1943	1944	1945	1946	1947	1948	1949	1950	Percent Change, 1950 from 1949
Mobile loaders	234	286	359	495	486	725*	286*	289*	+ 1.0
Scrapers†	15	29	26	25	35	49	18	9	—50.0
Conveyors‡	1,100	708	881	1,157	987	1,209	541	373	—31.1
Pit-car loaders	?	...§	...§	...§	...§	...§	...§	...§	.....
Total	1,350	1,023	1,266	1,677	1,508	1,983	845	671	—20.6
Number of manufacturers reporting	24	22	25	24	23	22	22	20	.....

*Includes continuous miners. †Reported as scrapers or scraper haulers and hoists. ‡Includes hand-loaded conveyors and those equipped with duckbills or other self-loading heads. §Canvass of sales of pit-car loaders discontinued in 1945.

SHIPMENTS of mechanical-loading equipment for underground use in coal mines in the United States, in terms of capacity, were 5% less in 1950 than in 1949. The capacity of mechanical-cleaning equipment sold for use at bituminous coal mines was 8% less in 1950 than in 1949. Shuttle-car shipments for use in coal mines in the United States decreased 14% in 1950 from 1949, while "mother" conveyors increased 15% during the same period.

This survey was made possible by the courteous cooperation of all known manufacturers of mechanical-cleaning equipment for bituminous coal and manufacturers of loading and supplementary haulage equipment for use in all coal mines in the United States. Data from various trade journals also were utilized.

Mechanical-loading-unit and supplementary - haulage - equipment "Sales in 1950" represent shipments made during 1950. However, less than half of the mechanical-cleaning equipment sold in 1950 was placed in operation during that year. The remainder will be installed later.

Mechanical Loading

Bituminous coal and lignite mechanically loaded in underground mines decreased from 295,806,285 tons in 1948 to 222,375,882 tons in 1949, or 25%. Mechanical loading in Pennsylvania anthracite mines decreased from 15,742,368 tons in 1948 to 11,858,088 in 1949, or 25% also.

Table I shows data on bituminous and lignite production by methods of mining and mechanical cleaning for 1948-50, inclusive. The percentage of the total output mechanically loaded continues to increase. During 1950, approximately

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Table IV—Sales of Mechanical Loading Equipment in 1950 Compared to Machines in Active Use in Preceding Years

	1943	1944	1945	1946	1947	1948	1949	Number of Machines Sold, As Reported by Manufacturers in 1950
Bituminous and lignite mines:								
Mobile loading machines	2,525	2,737	2,950	3,200	3,569	3,980*	4,205*	289*
Scrapers	83	87	87	75	67	56	46	1
Pit-car loaders	321	241	142	93	71	37	17	...†
Conveyors equipped with duckbills or other self-loading heads	1,226	1,331	1,383	1,521	1,531	1,632	1,483	...‡
Hand-loaded conveyors, number of units	3,191	3,236	3,385	3,470	3,979	4,125	4,312	316
Anthracite mines (Pennsylvania):								
Mobile loading machines	5	12	20	27	25	19	27	...
Scrapers	510	491	549	564	594	643	589	8
Hand-loaded conveyors, number of units§	2,701	2,807	3,006	3,233	3,457	3,563	3,618	57

*Includes continuous miners. †Canvass of sales of pit-car loaders discontinued in 1945. ‡Sales of conveyors equipped with duckbills or other self-loading heads are included with hand-loaded conveyors. §Includes pit-car loaders and conveyors equipped with duckbills or other self-loading heads.

Table V—Mechanical Loading Equipment in Actual Use in 1949, by States, Compared With Sales Reported in 1950

	Mobile Loaders*		Scrapers		Conveyors†	
	In Use in 1949	Sales in 1950	In Use in 1949	Sales in 1950	In Use in 1949	Sales in 1950
Bituminous and lignite mines:						
Alabama	147	13	21	...	431	...
Arkansas	...	1	...	...	75	2
Colorado	38	2	1	1	307	1
Illinois	552	20	...	...	14	15
Indiana	187	5	...	...	5	...
Iowa	2	...	...	...	3	...
Kentucky	450	35	...	...	699	51
Maryland	...	...	...	...	38	1
Montana	33	...	...	...	8	...
New Mexico	21	...	4	...	1	...
North Dakota	7	...	...	...	...	...
Ohio	202	12	...	...	149	12
Oklahoma	4	...	...	...	122	...
Pennsylvania	989	76	4	...	932	73
Tennessee	26	2	...	...	214	4
Utah	111	10	1	...	108	...
Virginia	132	...	...	...	204	4
Washington	...	1	7	...	91	...
West Virginia	1,291	89	...	...	2,166	153
Wyoming	31	3	8	...	258	...
Total	4,205	289	46	1	5,795	316
Pennsylvania anthracite	27	...	589	8‡	3,618	57
Grand total	4,232	289	636	9	9,413	373

*Includes continuous miners. †Includes hand-loaded conveyors and conveyors equipped with duckbills or other self-loading heads. ‡Includes also pit-car loaders.

77% of the total output was either mechanically loaded at underground mines or loaded by power shovels at strip mines.

Underground production of bituminous and lignite, by methods of loading, is shown in Table II. The preliminary figures for 1950 show that 69.3% of the underground output was loaded mechanically and the remainder, or 30.7%, was hand-loaded into mine cars.

• **Types of Units Sold**—Table III lists the number of units of mechanical-loading equipment shipped for underground use at all coal mines in the United States, 1943-50, inclusive. Mobile loader shipments, which include continuous miners, increased from 286 in 1949 to 289 in 1950, or 1%. During the same period, shipments of scrapers decreased from 18 to 9, or 50%, and shipments of conveyors decreased from 541 to 373, or 31%.

Exports of underground mechanical-loading equipment in 1950, in terms of capacity, amounted to 14% of the shipments made to mines in the United States. This compares with 38% in 1949.

• **Types of Mechanical Loading Equipment Sold Compared to Units in Use**—Table IV shows the trends in demand for various types of mechanical-loading equipment. During the past several years, there has been a substantial increase in the use of all types of mechanical-loading equipment except scrapers and pit-car loaders.

The total number of mechanical-loading units of all types in use at Pennsylvania anthracite mines increased from 3,216 in 1943 to 4,234 in 1949, or 32%, against a 37% increase at bituminous and lignite mines for the same period.

• **Types Purchased, by States**—Table V shows the number of mobile loaders (including continuous miners), scrapers and conveyor units shipped to various states in 1950 and the number in use in 1949. West Virginia continued to lead in receiving the greatest number of mobile loaders and conveyors shipped in 1950, followed by Pennsylvania, Kentucky and Illinois in the order named.

Haulage Equipment

• **Shuttle Cars**—Although sales of shuttle cars decreased from 543 in 1949 to 465 in 1950, the percentage of the total underground output handled by shuttle cars continued to increase rapidly. In 1944, shuttle cars handled 8% of underground bituminous production. Five years later, in 1949, the latest year for which data are available, 22% was handled by shuttle cars.

Table VI shows the sales of shuttle cars, by states, for the years 1936-48, inclusive, 1949 and 1950. Exports of shuttle cars in 1950 decreased 11% from 1949.

Table VI—Sales of Shuttle Cars, 1936-48 Inclusive, 1949 and 1950, and "Mother" Conveyors, 1948-50, by States

	Shuttle Cars			"Mother" Conveyors		
	1936-48	1949	1950	1948	1949	1950
Bituminous and lignite mines:						
Alabama	181	35	7	6	...	...
Arkansas	...	...	...	...	...	1
Arizona	...	...	...	1	...	...
Colorado	41	10	5	...	3	...
Illinois	290	76	75	14	8	16
Indiana	125	22	15	...	4	...
Kentucky	518	61	94	41	16	24
Missouri	...	1	...	...	...	...
Montana	2	...	...	...	...	...
New Mexico	13	...	...	...	...	...
North Carolina	...	...	...	...	1	...
North Dakota	9	...	...	...	...	...
Ohio	127	15	24	5	3	8
Oklahoma	...	...	7	5	3	4
Pennsylvania	483	143	111	25	13	29
Tennessee	69	2	...	3	...	...
Utah	55	15	20	...	2	2
Virginia	70	5	2	4	3	4
West Virginia	850	155	99	124	59	41
Wyoming	14	3	6	2	1	3
Total	2,847	543	465	230	116	132
Pennsylvania anthracite	2	...	...	5	...	1
Grand total	2,849	543	465	235	116	133

Table VII—Number of Mobile Loaders in Use in Bituminous and Lignite Mines, by Types of Haulage, in Each State

	Number of Mobile Loaders*							
	Loading Direct Into Mine Cars		Loading Into Conveyors		Loading Into Shuttle Cars		Total Number In Use	
	1948	1949	1948	1949	1948	1949	1948	1949
Alabama	31	30	63	56	49	61	143	147
Arkansas	1	...	...	...	...	...	1	...
Colorado	16	13	...	1	16	24	32	38
Illinois	380	344	27	11	158	197	565	552
Indiana	111	109	...	...	52	99	163	167
Iowa	2	2	5	...	...	...	7	2
Kentucky	267	175	22	24	193	251	422	450
Maryland	...	...	...	...	1	...	1	...
Montana (bit. and lig.)	31	28	...	...	4	5	35	33
New Mexico	13	15	...	...	6	6	19	21
North Dakota (lig.)	7	7	...	...	...	...	7	7
Ohio	114	108	23	23	58	71	195	202
Oklahoma	...	..	4	4	...	...	4	4
Pennsylvania (bit.)	612	600	84	78	232	311	928	989
Tennessee	6	7	1	...	19	21	26	28
Utah	48	45	8	5	35	61	91	111
Virginia	84	91	4	4	27	37	115	132
West Virginia	791	739	74	97	332	455	1,197	1,291
Wyoming	25	26	...	...	4	5	29	31
Total	2,479	2,338	315	303	1,186	1,564	3,980	4,205

*Includes continuous miners.

• **"Mother" Conveyors**—For the purpose of this study, a "mother" conveyor is defined as a sectional extensible power-driven conveying unit that can handle over 500 ft of conveyor. It may be distinguished as a gathering conveyor, haulage conveyor or main-haulage conveyor. Main-slope conveyors are excluded. The last three columns of Table VI show the sales of "mother" conveyors, by states, for 1948-50, inclusive. Exports of "mother" conveyors were 40% less in 1950 than in 1949.

• **Transporting Coal From Mobile Loaders**—Table VII shows the number of mobile loaders and continuous miners in bituminous and lignite mines by states and types of haulage in 1948 and 1949. The total number in use increased from 3,980 in 1948 to 4,205 in 1949, or 6%, while the number loading into shuttle cars rose from 1,186 to 1,564, or 32%. During 1949, 41% of the total bituminous and lignite loaded by mobile loaders was handled by shuttle cars. The remainder of the mobile-loader tonnage was loaded onto conveyors (4%) or directly into mine cars (55%). During 1949, approximately 2,800 shuttle cars were in use in bituminous and lignite mines in the United States, about 22% of these being of the battery type.

Table VIII—Bituminous Coal Cleaned in 1949 and Capacity of Equipment Sold in 1950, by Types

	1949			Annual Capacity of Equipment Sold in 1950, Net Tons†
	Number of Plants in Operation	Net Tons of Cleaned Coal*	Percent Cleaned by Each Type*	
Wet methods:				
Jigs	290	72,422,697	47.1	.....‡
Concentrating tables	15	4,039,523	2.6	.....‡
Classifiers	82	14,885,281	9.7	.....‡
Launders	18	11,238,108	7.3	.....‡
Dense media	104	17,821,524	11.6	.....‡
Jigs and concentrating tables	15	3,387,798	2.2	.....‡
Other combinations and methods	36	17,033,067	11.1	.....‡
Total wet methods	560	140,707,988	91.6	12,300,000
Pneumatic methods	82	12,943,915	8.4	1,100,000
Grand total	6381	153,651,903	100.0	13,400,000

*Includes plants operated by consumers at central washeries in Colorado and Pennsylvania. †Based on 157 days (average days mines were active in 1949) and 7.0 hr per day. ‡Included under "Total wet methods." §Includes a duplication of 67 plants using both wet and pneumatic methods. Deducting this duplication gives a net total of 571 plants that cleaned coal in 1949.

Mechanical Cleaning

Reports from 20 manufacturers of bituminous cleaning equipment show that the total capacity of 1950 sales was 12,200 net tons of clean coal per hour, compared with 13,300 tons in 1949, a decrease of 8%. Sales were made in 12 states and Alaska. Illinois received 30% of the total capacity of the 1950 sales and West Virginia and Pennsylvania followed with 26 and 16%, respectively.

Table VIII gives data on bituminous cleaned in 1949 by type of equipment in use and also the annual capacity of equipment sold in 1950. Sales in 1950, by type of equipment, show that jigs hold first place, with dense-media and wet tables following.

Safety—New High in 1950

Fatality Rate Continues to Improve — Another Year Passes Without Major Disaster — Management, Labor, Federal and State Agencies Find Results in Teamwork — Still Room for Further Improvement

By FORREST T. MOYER, Chief, Accident Analysis Branch

THE LOWEST FATALITY RATE in history and the absence of major disasters pointed up the continued progress in coal-mine safety through 1950. In each of the last 3 yr, the fatality rate per million tons has established new record lows. The year 1950 was the second successive calendar year in which there were no major disasters in coal mines.

This marked and continued improvement has resulted directly from increasing participation by management and labor in well-planned accident-prevention work and from state and federal inspection services aimed at maintaining safety standards and educating workers and mine officials in safe practices and operating methods. Although the safety record improved in 1950, ample opportunity remains for faster progress in reducing the injury record.

Coal-mine fatalities in 1950 occurred at the new record low rate of 1.16 per million tons—a 6% improvement over the former low of 1.23 in 1949. A total of 637 fatal injuries occurred in 1950, as estimated from nearly complete reports. Though this was 44 more than in 1949, the 1950 total was the second lowest annual figure in coal's statistical history. The larger figure in 1950 is related directly to increased production—an estimated total output, bituminous and anthracite, of 550,392,000 tons, nearly 70,000,000 tons or 15% above 1949.

Comparing fatalities in 1950 with those of 10 yr ago (1940) shows substantial gains. In 1940, 1,388 men lost their lives at the rate of 2.71 per million tons in mining 512,808,000 tons. Although more coal was mined, the number of fatalities and the rate in 1950 were less than half the 1940 figures.

● **No Major Disaster** (five or more deaths in a single accident) has occurred in a coal mine for 26 mo, the longest period on record free of these serious and severe accidents. Previously the longest disaster-free period was the 12½ mo between July 1, 1938, and July 14, 1939. The last major disaster occurred at a Maryland mine Nov. 4, 1948, when five men were suffocated. No major disaster has occurred in anthracite since Dec. 11, 1947.

The long-term improvement in the disaster record may be gaged by comparison with 1940, when six major disasters took 276 lives. In 1910, 19 major disasters killed 492 men.

The principal causes of disasters are present in day-to-day mining operations. They are controlled only through constant and effective safe practices—rock-dusting, adequate ventilation and fire-fighting protection. From incomplete reports, the Bureau has recorded 17 explosions of gas or dust and 21 mine fires in 1950.

● **Roof-Bolting** holds much promise in preventing injuries from falls of roof. Up to now, only two fatal roof-fall accidents are known in which roof bolts were directly involved as standardized support. Three men were killed in one accident and one in the other.

At the end of 1950 approximately 450 large mines (daily capacity of over 1,000 tons) were using roof-bolting. At about 20 of these roof-bolting is used exclusively. The Bureau's Roof Control Section estimates that about 75,000,000 sq ft of roof has been roof-bolted through 1950. Acceptance of this method has been greatest in Alabama and West Virginia. A report by A. J. Alexander, chief, West Virginia Department of Mines, estimates that from July 1, 1949, to June 30, 1950, about 5½% of the output of commercial mines in West Virginia was mined from roof-bolted and dependent areas. These investigations indicated that the greatest benefit to safety would be at or near the working faces.

It is emphasized that roof-bolting should not be tried until a thorough study has been made of the roof strata and approval has been secured from the proper authorities. The accepted safe requirements are: (1) an experimental period to determine the proper type and placement of

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Coal-Mine Fatalities in the United States During 1950*

Cause and location	Bituminous: Number of fatalities	Bituminous: Rate per million short tons	Pennsylvania Anthracite: Number of fatalities	Pennsylvania Anthracite: Rate per million short tons	Total: Number of fatalities	Total: Rate per million short tons
Underground:						
Falls of roof and face	315	0.622	58	1.307	373	0.678
Haulage	104	0.205	6	0.135	110	0.200
Explosions: Local	3	0.006	5	0.112	8	0.015
Major	...	....	..	....	..	....
Explosives	10	0.020	4	0.090	14	0.025
Electricity	13	0.026	1	0.023	14	0.025
Machinery	14	0.028	..	....	14	0.025
Mine fires	...	....	..	....	..	....
Shaft	3	0.006	2	0.045	5	0.009
Miscellaneous	8	0.016	1	0.023	9	0.017
Total underground	470	0.929	77	1.735	547	0.994
Stripping	34	0.067	6	0.135	40	0.072
Surface	41	0.081	9	0.202	50	0.091
Grand total, 1950	545	1.077	92	2.072	637	1.157
Grand total, 1949	500	1.142	93	2.178	593	1.234
Production, 1950 est.	506,000,000		44,392,000		550,392,000	
Production, 1949	437,868,000		42,702,000		480,570,000	

*Estimated from nearly complete returns.

bolts; (2) development of a definite plan of installation based on experimental data; (3) proper equipment for installing bolts; and (4) maintenance of extremely close supervision and adherence to the plan.

• **The Fatality Rate in Bituminous** and lignite mines in 1950 was reduced to 1.08 per million tons—a 5% improvement over the former low in 1949. An estimated total of 545 men were killed in mining 506,000,000 tons. Although there were 45 more fatalities than in 1949, the greater loss of life in 1950 was a result of increased production.

In proportion, the number of fatal injuries in 1950 was 9% greater, whereas bituminous output was 16% greater than in 1949. Ten years ago, 1,204 men were killed at a rate of 2.61 per million tons in mining 461,319,000 tons. The 1950 record is clear evidence of the substantial long-time improvement in safety.

• **Anthracite Fatalities** in 1950 set a new low rate of 2.07 per million tons of clean coal—5% better than in 1949. The estimate of 92 deaths also was a record-low annual total, being one less than in 1949. The marked improvement during the last decade is shown by comparison with 1940, when 184 fatal injuries occurred at a rate of 3.57 per million tons in mining 51,489,000 tons.

• **Causes of Accidents** generally were better controlled in 1950. The fatality rate for each cause of injury, shown in the accompanying table, was lower in 1950 than in 1949, except at strip mines. Both the number of fatalities and the rate per million tons at strip mines were about double the 1949 figures.

In 1950, the greatest improvement is shown in haulage, explosives and machinery accidents. Control of roof and face falls was slightly better, with a rate of 0.68 per million tons in 1950 against 0.69 in 1949.

Of the total of 637 fatalities, 547 occurred underground, 50 at surface works associated with deep mines and 40 at strippings.

• **Falls of Roof and Face** in 1950 caused by far the largest number of fatal injuries—373, or 59% of the total. Although this was 36 more than in 1949, the fatal-injury rate was lower in 1950 because of increased production.

A remarkable improvement in the roof-fall fatality record has been shown by mines in Alabama, where a larger proportion of the output is from roof-bolted or dependent areas than in any other state. In 1948, when roof-bolting was initiated in Alabama, 26 men were killed by roof falls in mining 18,754,000 tons. Roof-bolting spread rapidly in Alabama mines and roof-fall accidents were considerably fewer in both 1949 and 1950. In 1949, roof falls caused nine deaths in mining 12,934,000 tons; in 1950, six deaths in mining 15,182,000 tons.

Fatality experience from falls of roof and face in 1950 was slightly better in bituminous but slightly worse in anthracite. In bituminous, 315 men were killed by this cause at a rate of 0.62 per million tons, compared with 0.64 in 1949; in anthracite, 58 men at the rate of 1.31, compared with 1.29 in 1949.

• **Underground Haulage,** usually the second leading hazard in coal mining, caused the deaths of 110 men in 1950, eight fewer than in 1949. The rate was 0.20 per million tons, 17% lower than in 1949.

The fatality experience from underground haulage accidents improved in both anthracite and bituminous. The largest improvement was in anthracite, where six men were killed at a rate of 0.14 per million tons, or less than half the 1949 rate of 0.33, when 14 men lost their lives in haulage. In bituminous, 104 men were killed by haulage in both 1949 and 1940. However, the 1950 rate of 0.21 per million tons was a 13% improvement over the 1949 rate because of increased coal production.

• **No Major Explosions of Gas or Dust** occurred in 1950. However, four local explosions killed eight men. These data are identical with 1949 data. Two of the local explosions in 1950 were in bituminous mines in Indiana and western Pennsylvania. The remaining two were in Pennsylvania anthracite, one of which killed four men.

There have been no major explosions of gas or dust since the one in Alabama, July 30, 1948. This freedom from major explosions is a clear indication of improvements in ventilation, dust control and rock-dusting. However, it should be unnecessary to point out the continuous presence of the explosion hazard and the necessity of maintaining constant controls. Incomplete reports of the Bureau record 17 local explosions of gas or dust in 1950.

• **Explosives** caused fewer fatalities in 1950—14, against 17 in 1949—despite the increased consumption of explosives. Fatalities from gas and dust explosions in which explosives may have been a contributing factor are not included in this classification. As a direct cause, explosives killed 10 men in bituminous and four in anthracite, compared with 13 and 4, respectively, in 1949.

• **Electricity** was the direct cause of 14 underground fatalities in 1950—two more than in 1949. Experience in control of this hazard was not as favorable in 1950 in either bituminous or anthracite. There were 13 deaths from electricity in bituminous—one more than in 1949. In anthracite deep mines, one man was killed by electricity, against no fatalities from this hazard in 1949.

• **Machinery Hazards,** as gaged by fatalities, were better controlled in 1950 than in 1949, although more machinery was being used. The total of 14 fatal injuries from machinery in 1950 was three less than in 1949 and the rate was reduced approximately one-fourth, to 0.03 per million tons. All fatalities from machinery were in bituminous mines in both 1950 and 1949.

• **Other Causes,** besides the foregoing principal causes, accounted for only 16%, or 104, of the total 637 fatalities. These 104 fatal injuries were from a variety of relatively minor causes in all types of coal mines.

• **In Stripping,** both bituminous and anthracite, safety receded in 1950. In bituminous strippings, 34 men lost their lives, double the number in 1949. At anthracite strip mines, six men were killed, against one in 1949. In surface works at deep mines, the fatality experience was better in bituminous but worse in anthracite. A total of 50 men were killed in surface works at all mines—the same number as in 1949.

• **Non-Fatal Injuries** in 1950 added up to an estimated tentative total of 37,850 at all coal mines—a rate of 68.77 per million tons. Of this total, 29,000 are estimated for bituminous, with a frequency rate of 57.31 per million tons. The remaining 8,850 are estimated for anthracite, at a rate of 199.36. These estimates are based on the experience of reporting companies in the first 9 mo of 1950 and are subject to revision.

PRICE PLANT FROM THE WEST HEADHOUSE, with the blending and storage bin at right; service center across the highway from the plant; and refuse-disposal conveyor up the hill in the background.

The Price Plant Story

1. Design . . . Preliminary Preparation . . . Service

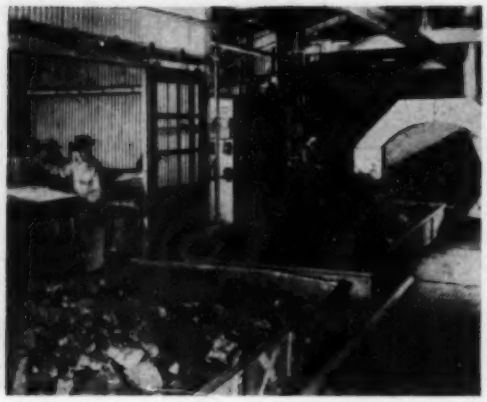
Planned to Develop 30,000 Acres of Reserves, New Inland Steel Plant Features Modern Facilities for Handling Company-Mined and Purchased Coal—Preliminary Separation of Coal and Rock Made at Headhouse

PURCHASE OF 10,700 acres of Elkhorn No. 3 seam and erection of a 750-tph preparation plant in the general vicinity of its old mines at Wheelwright, Ky., has increased many-fold the by-product coal reserves of the Inland Steel Co. The new plant includes equipment for unloading, blending and washing truck and railroad coal purchased from neighboring mines. A milling-in transit rate already is drawing coal from 20 mi which, after preparation, doubles back over the same route as it moves to final destination.

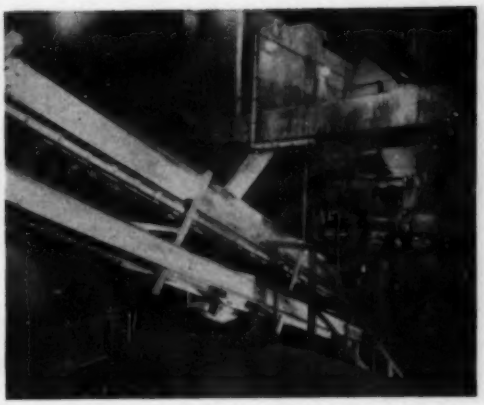
The plant has a projected life as it will process Inland's large reserves of unmined coal and it is available to the unmined reserves of other companies in the Elkhorn field. Design and construction of the project, which includes a 4½-mi underground haulway and a service-center building and auxiliaries at the new location, were aimed at low maintenance over the relatively long life. Blending facilities are the most efficient that present practice has to offer.

● **Goals in the Design**—of the coal-washing and preparation equipment in addition to a high cleaning efficiency, were to hold surface moisture to less than 4% without the use of heat driers and to operate the plant on a closed water circuit.

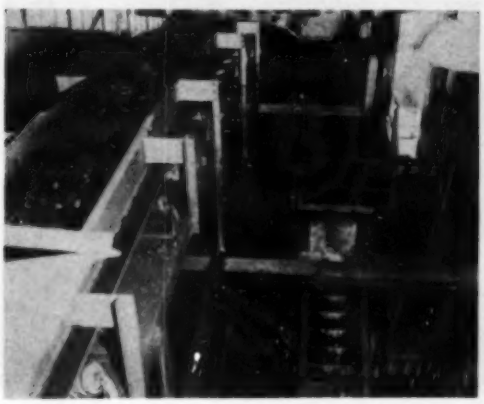
In acquiring its coal holdings,



COAL CARS averaging 2.85 tons are dumped two at a time at the headhouse. Mine rock also is dumped here and diverted by a flygate to a separate hopper preceding a crusher.



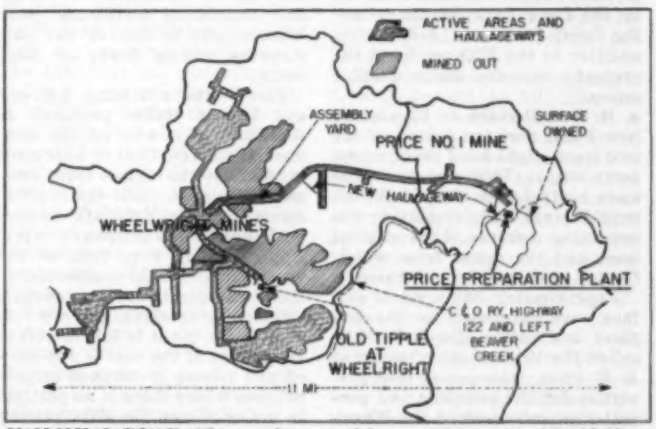
ROCK CRUSHER and flight conveyor elevating to the retarding rock belt. In this same building, immediately below the headhouse, the coal is screened, picked and reassembled.



BELT CONVEYOR (left) moves coal down hill to the new plant, while rock is fed into apron conveyor (lower right) for discharge to separate belt conveyor (right background). Photo at right also shows coal belt (left) and rock belt (right).

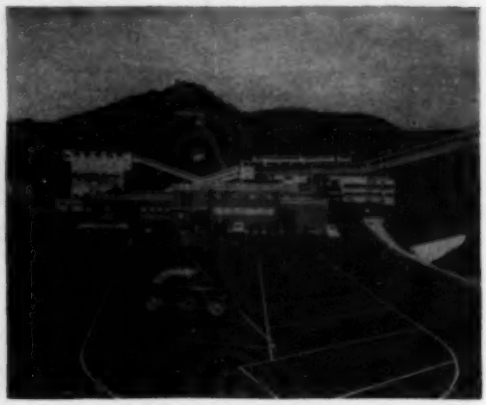
Inland Steel, which operates by-product ovens at East Chicago, Ind., secured the lease on 14,434 acres of Elkhorn coal and purchased 1,596 acres of surface and the houses and mining plant at Wheelwright, Ky., in 1930 (left-hand portion of the accompanying property map). In 1932 a modernization and expansion program, including a 750-tph tipple with aerial-tram refuse disposal, was completed at Wheelwright (*Coal Age*, December, 1932).

Since that time, the company has acquired approximately 16,000 additional acres adjoining the original lease, the center of which is about 7 mi down Left Beaver Creek from Wheelwright. Most of the present holdings of close to 30,000 acres lie in Floyd County. However, parts of both the origin-

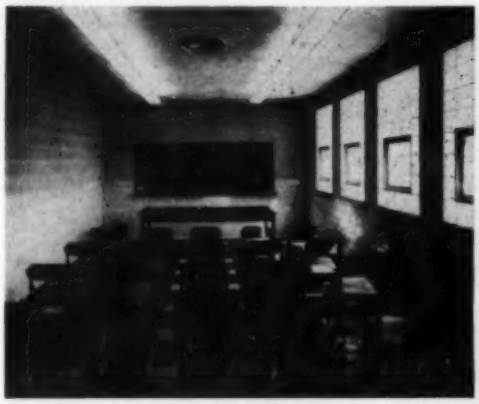


PRICE PREPARATION PLANT is near the center of the new 10,700-acre Inland Steel holdings (right). The property operated by the Wheelwright mines is at the left.

Modern Service Center Adds to Efficient Operation at New Price Plant



PRICE SERVICE CENTER faces State Highway 122 and the preparation plant, with the rock-disposal conveyor from the plant up the east hill appearing in the background. From the rear of the service center (right photo), the blending bin may be seen at the left and the plant immediately ahead.



ASSEMBLY ROOM (left) and the coal-analysis laboratory also are located in the service-center building.

al and new tracks are in Pike and Knott counties. The area is served by the Long Fork Branch of the Big Sandy Division, C & O Ry. In addition to the Elkhorn No. 3 the property includes other minable seams.

● **It Was Decided to Locate the New Plant** near the center of the new tract (right-hand portion, property map): This also makes it more central than the old Wheelwright plant with respect to the remaining reserves of the original lease and the mines from which foreign coal may be purchased.

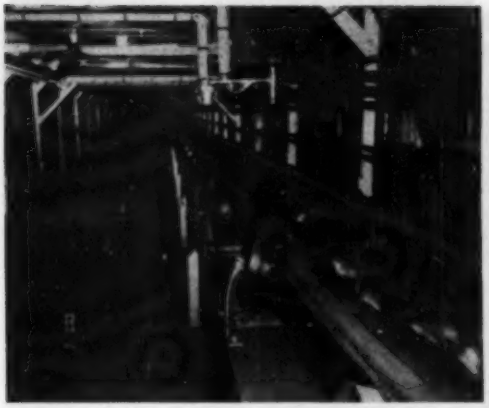
Approximately 580 acres of surface were purchased for the new plant and refuse disposal. It is called the Price plant in honor of E. R. Price, manager of coal properties for the company and general superintendent of the Wheelwright mines for the years beginning with the Inland Steel improvement program. With its fine homes, excellent club house and community swimming pool, Wheelwright is one of the outstanding mining towns of Kentucky.

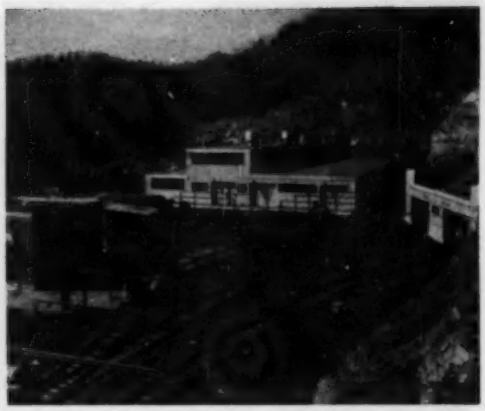
Part of the 5-in lump, 5x3 egg and 1x¼-in stoker produced at Wheelwright is sold on the commercial market. Coal of finer sizes is purchased to replace these commercial sales to fulfill the requirements for 2-in nut-slack by-product coal for the company's ovens. Approximately 8 to 10% of the plant output is sold commercially; the remainder is captive tonnage.

Generally speaking, the raw-coal feed to the plant is low in refuse since most of the coal is Joy-loaded and mining is confined largely to areas where there is no parting. In a few places the slate parting comes down and is loaded with the coal. As time goes on, some sections may be changed to full-seam mining. Plant design provides for an ultimate reject as high as 20%.

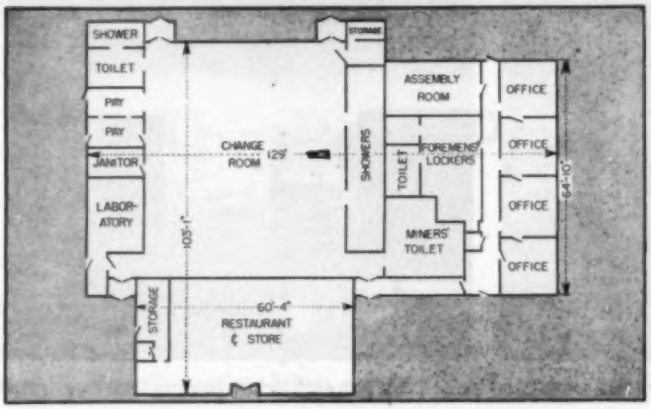
● **To connect the Wheelwright mines** with the new plant, it was necessary to develop 4½ mi of haulway. Work was started in December, 1946, and the last cut-through was made in December, 1948. To speed the work a temporary mine (Buckingham) was opened at an intermediate point. This Buckingham entry intersected the line of the new haulway at a point about 1,000 ft from the crop opening, after which the haulway was driven in two directions. In all, the haulway project was pushed from four points, the other two being the old Wheelwright mines and a new opening at the Price-plant location.

Nearly 4 ft of rock was taken on the advance in the main heading and about half that in the air-





HIGH-SPEED CORD BELT elevating mine rock and washer refuse to a dump on the east hill. Above the belt is one of several unit heaters that keep wet refuse from freezing on the belt. Floor supports (left) are for a retarding conveyor when a mine is opened on the east hill. Mine office, shop and lamp-house building, and portal, Price No. 1 mine, are shown in photo at right.



FLOOR PLAN of the service-center building, across the highway from the plant.

course. Grading required taking down as much as 14 ft of top and lifting as much as 5 ft of bottom. The maximum average grade against the loads for a full trip length is 1.25%.

The single-track haulway is constructed of 80-lb steel on 5x7-in by 8-ft creosoted ties. Five 1,500 ft passing tracks were installed. Block signals, operated automatically from pendulum directional trolley switches, together with electric track switches operated by the same type of trolley contactors, provide for safe haulage at high speeds.

A triple-track assembly yard 2,300 ft long, with a dispatcher's office at the center, was built at a point 5½ mi from the Price No. 1 mine portal. Mine roof in the assembly yard and over a large portion of the new haulway is secured by roof bolts.

H. O. Zimmerman, chief engineer of coal mines for the Inland Steel Co., worked out the location for the new preparation plant and drew up general specifications. The Link-Belt Co. contracted the design and construction. Cleaning is based on washing the 5x¼ coal in two Link-Belt air-pulsated wash boxes and ¼x0 on 18 Deister Concentrator Co. SuperDuty Diagonal Deck tables. Five Bird filters dewater coal from the tables and one dewaters the table refuse. Two Bird polishers clarify a portion of the water in the circulating system.

● **The rotary dump at the headhouse** at Price No. 1 mine, on the west side of the valley, is 290 ft above the railroad tracks of the new plant. There is no place for refuse on that hillside but there is space for some on the east hillside where, at some later date, another mine will be opened. Consequently, mine rock and picked refuse from a screening and picking house below the dump hopper are conveyed down the hill, through the plant and then up the east hillside for disposal. Refuse from the washers and tables in the plant discharges to a belt in this same disposal system.

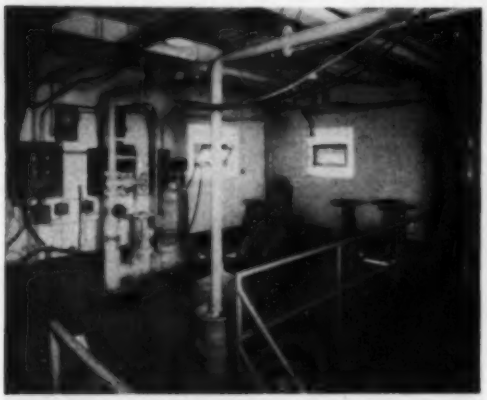
Mine-rock and ROM retarding belt conveyors are in one wide gallery on the west side. The east hillside gallery, containing only the refuse-elevating conveyor, was made sufficiently wide to permit installation of a retarding ROM belt when the mine is opened on that side.

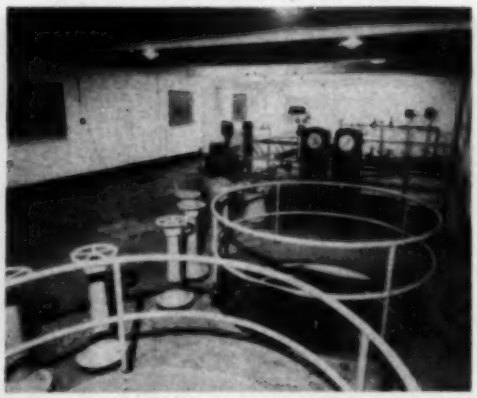
● **New facilities on the hill** at the portal include a large steel building housing a shop, locomotive barn and lamphouse; another steel building serving as a car shop; a brick mine office; and a sand house with mechanized drying and handling equipment.

The headhouse is approximately 1,000 ft around the hill from the portal. Cars are weighed on a Streeter-Amet scale between the feeder and a two-car Link-Belt rotary dump. Both the slate and coal cars are weighed, the former as a check on the quantity of mine rock handled and the latter for performance data on production units.

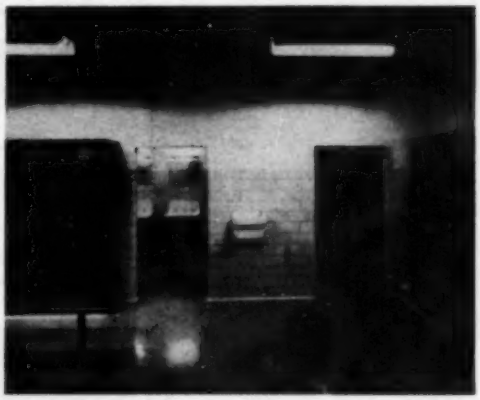
A flygate under the dump diverts the coal and mine rock to respective hoppers. Two 54-in belts 98 ft long on 124-ft horizontal centers carry the coal and rock from reciprocating feeders under the dump hoppers to the rock-crushing and coal-screening-and-picking house. The mine rock is

Automatic Treating Plant Supplies Town and Plant Water at Price





AUTOMATIC TREATING PLANT supplies water for both town and plant use. Two 30-hp turbine pumps draw raw water from the creek and pump it to two large storage tanks supplying the cleaning plant. At the right, second floor of the treating plant.



TYPICAL OF THE FACILITIES in the service-center are the white miners' shower room (left) and the foremen's locker room (right).

broken to minus 6 in by a McLanahan & Stone roll crusher.

Practically all the material-handling and preparation equipment is of Link-Belt manufacture.

Coal travels down the hill at 360 fpm on a 48-in belt (211-ft vertical and 856-ft horizontal centers), while the rock descends through the same gallery on a 30-in belt operating at 350 fpm. At the plant the coal transfers to another 48-in belt (23-ft vertical centers, 134-ft horizontal), and to a second 30-in belt (30-ft vertical and 139-ft horizontal).

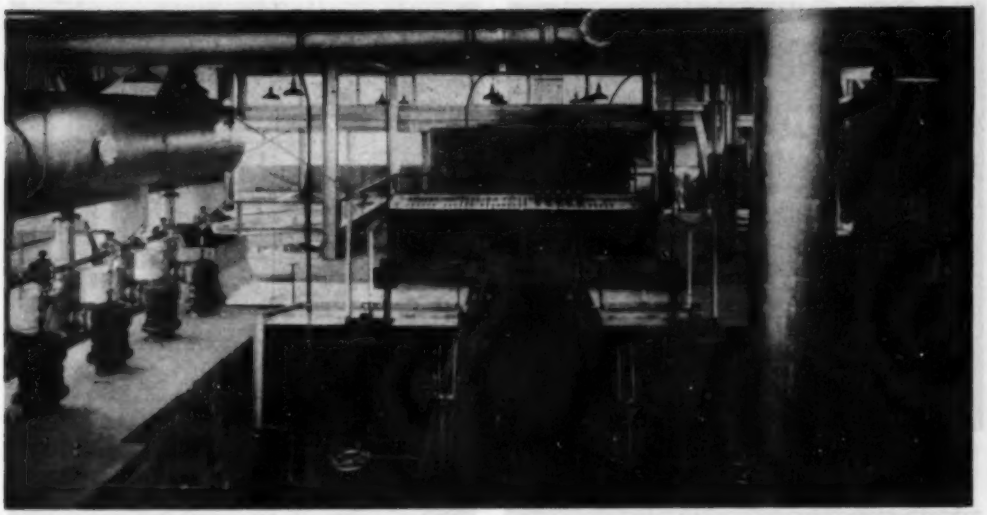
• **The crushed mine rock,** plus the wet refuse from the plant, are carried up the east hillside by the longest, strongest and fastest-moving of the 29 belts used on the job. This elevating refuse belt is a 30-in Goodyear 300 Cord unit operating at 550 fpm on a conveyor 187 ft in vertical and 965-ft in horizontal centers. All other belts are Lion Brand Buna-quality, made by the U. S. Rubber Co.

A second refuse belt, 92-ft vertical centers and 297-ft horizontal, relays the refuse to the disposal point. To prevent the wet refuse freezing on the belts, the galleries are steam-heated with Trane unit heaters, which type also is used throughout the main plant.

• **Immediately across the highway** from the plant a service-center building and commodious parking area were constructed. The brick service-center building, 103 x 109 ft, houses the bathhouse, coal-analysis laboratory, assembly room, plant offices and a combination restaurant and store. Shower, change and toilet rooms in the bathhouses have tiled walls and every facility for conveniently keeping the place clean and sanitary. The large parking lot and a smaller parking space in front of the building are paved with black top, with the larger lot marked off.

Distance from the bathhouse to the lamphouse at the portal is 3,000 ft via a paved road that crosses Left Beaver Creek and winds up the hill. Along this road five ranch-type brick houses have been built for the plant superintendent and other local officials.

To prepare creek water for drinking and town supply, an automatic treating plant was installed in a brick building between the railroad tracks and a point between the blending bin and creek. Mr. Zimmerman made the basic design but the details were worked out by Greely & Hansen, consultants, in conjunction with the Graver Tank & Mfg. Co., which supplied the tanks and water-treatment equipment for the plant. Raw water and relay-to-high-tank pumping equipment consists of three Fairbanks - Morse - Pomona pumps with 20- and 30-hp motors.

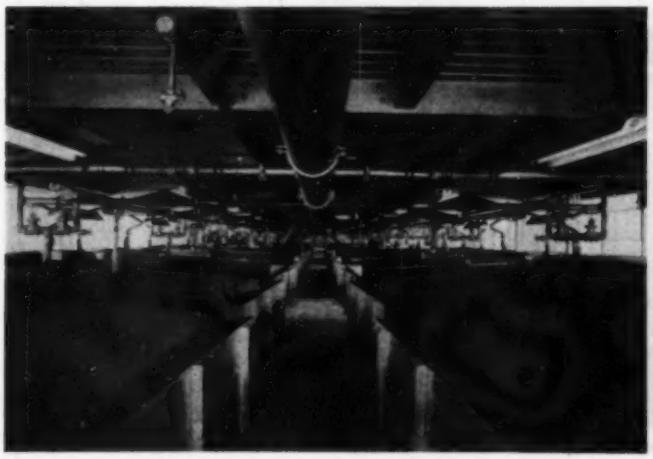


TWO AIR-PULSATED WASHERS, right and left, wash 5x¼ at Price plant. The control board and a control cabinet are in the center.

The Price Plant Story

2. Blending . . . Washing . . . Screening . . . Drying

Stepped Blending Bins, Air-Pulsated Wash Boxes, Tables and Centrifugal Filters Combined for High Product Uniformity, Top Operating Efficiency and Low Maintenance at 750-TPH Plant



EIGHTEEN TABLES wash the ¼x0 at the new Price plant.

COAL CLEANING at the new Price preparation plant of the Inland Steel Co. is based on washing the 5x¼ coal in two Link-Belt air-pulsated wash boxes and ¼x0 on 18 Deister Concentrator Co. Super-Duty Diagonal-Deck tables. Five Bird filters dewater coal from the tables and one dewaters the table refuse. Two Bird polishers clarify a portion of the water in the circulating system.

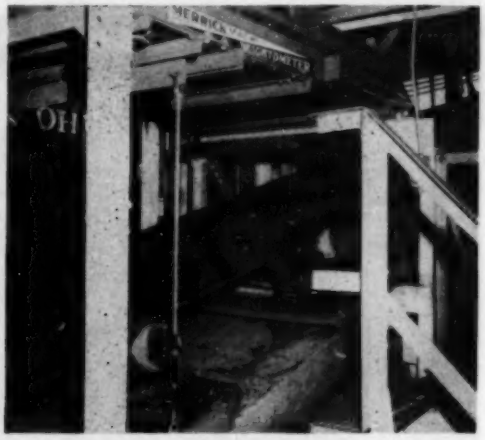
Uniformity of product being fully as important as efficient cleaning in the preparation of by-product coal, the company installed an elaborate blending plant which serves also for storage. Total capacity is 1,400 tons. With a stepped design, the operating capacity with efficient blending is limited to 1,000 tons, however.

ROM coals from the company's mines and from the neighboring operations (foreign coal) are routed over a main shaker which makes a separation at 5 in. The 5x0 is conveyed to the top of the blending plant by a 42-in belt with 59-ft vertical and 280-ft horizontal centers.

● At the top of the blending plant, a belt tripper distributes to five

Stepped-Bin Plant the Key to Uniform Blending of Coals at Price

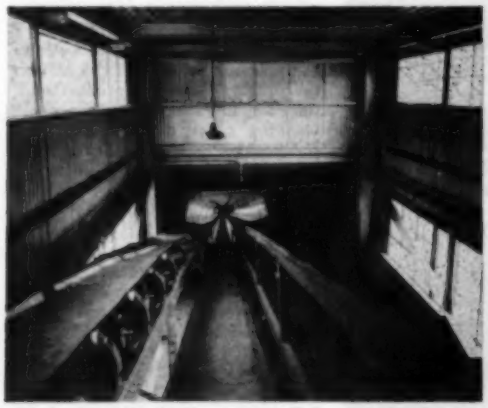
RAILROAD CARS of foreign (purchased) coal are unloaded by a mechanically vibrated shaker.



THIS BELT SCALE records the weight of all foreign coal elevated to the preparation plant.

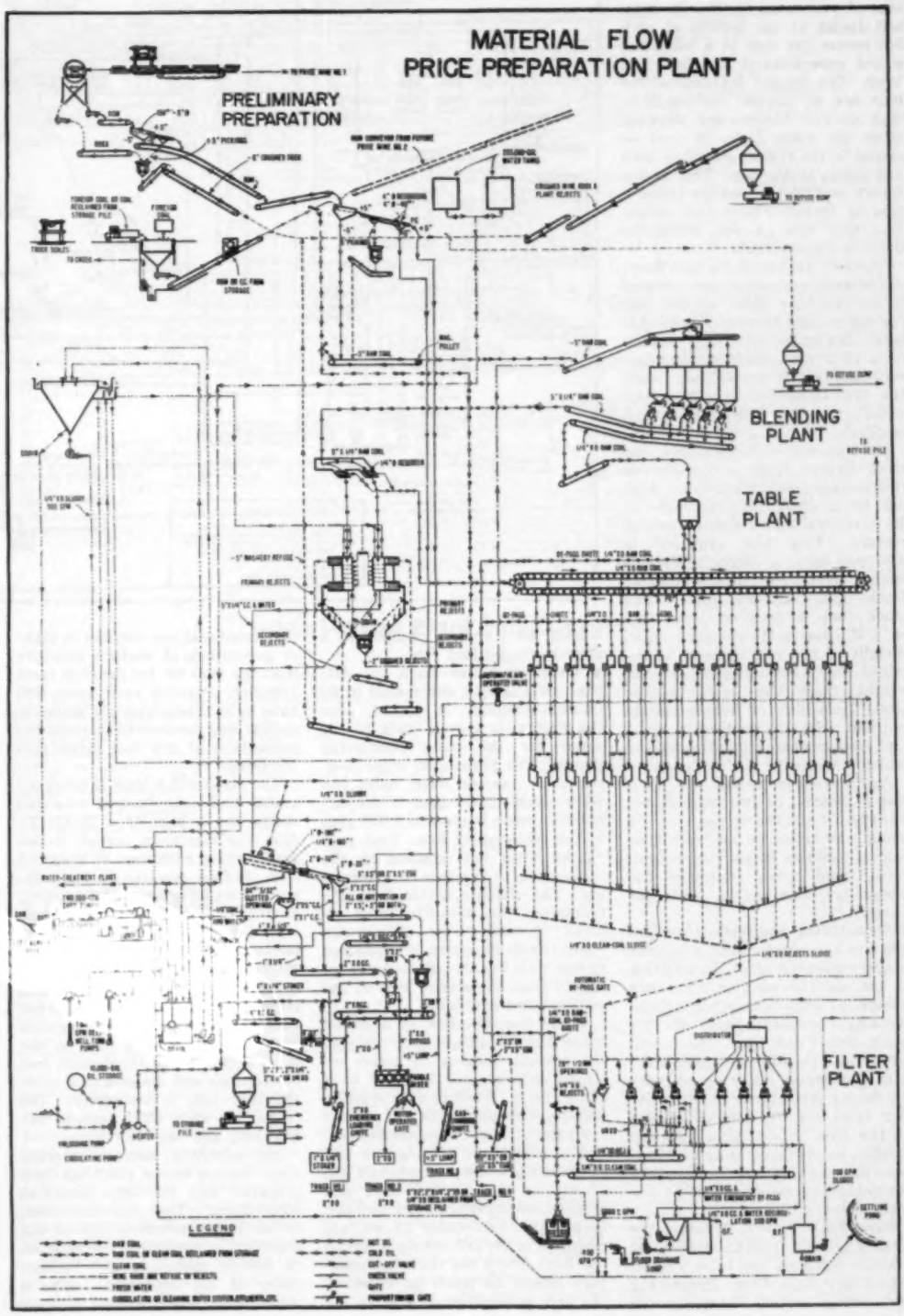
TOP OF THE BLENDING BIN, with the ROM belt in the center and the distributing tripper in the background.

FOUR OF THE FIVE VIBRATING SCREENS set at different elevations under the stepped-bottom blending bins.



BELTS CONVEYING the 5x1/4 and 1/4x0 from the blending bins to the top of the preparation plant.

WASHED-COAL SHAKER for dewatering and sizing. In the left foreground is the vibrator which further dewaters the 1x1/4 stoker.


MATERIAL FLOW
PRICE PREPARATION PLANT
PRELIMINARY PREPARATION
BLENDING PLANT
TABLE PLANT
FILTER PLANT
LEGEND

bins of graduated depths. A short belt feeder at the bottom of each bin moves the coal to a vibrating screen separating it into 5x¼ and ¼x0. The hopper bottoms of the bins are at stepped elevations so that no two feeders are drawing from the same layer of coal as placed by the tripper shuttling back and forth at the top. This is the fourth or fifth stepped-bin installation at United States coal mines. The first was at the Nemacolin mine in Pennsylvania.

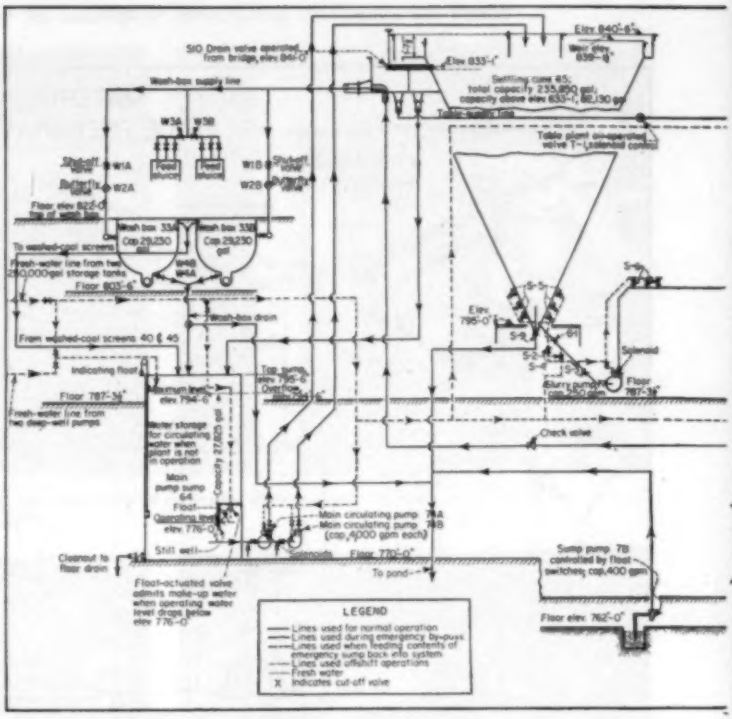
The two sizes made by the vibrating screens are moved and elevated to the washing plant by two belt conveyors side by side in one gallery. The larger size, 5x¼, travels on a 42-in belt (59-ft vertical centers and 280-ft horizontal) while the ¼x0 is carried on a 24-in belt (76-ft vertical, 390-ft horizontal centers).

Foreign coal is brought up to the main shaker from a combination railroad-car and truck-dump hopper by a 42-in belt conveyor on 68-ft vertical and 250-ft horizontal centers. This belt conveyor is equipped with a Merrick Weightometer which records the total of truck and railroad coal. The truck coal is weighed separately on a Fairbanks-Morse truck scale. Weight of the railroad coal is obtained by subtracting truck coal weight from the Weightometer total. Unloading of hopper-bottom railroad cars is facilitated by a Link-Belt mechanically vibrated car shaker handled by a Yale hoist.

As previously noted, the 5x¼ coal is cleaned in two air-pulsated wash boxes and the minus ¼ on 18 tables. Distribution of raw fines from a 100-ton surge bin to individual feed boxes supplying the tables is done by a Side-Kar Karrier.

● **Dewatering and water clarification** are the outstanding problems at every washing plant. In addition to getting the smaller sizes dry enough to ship during winter and avoiding contamination of the creek, the Price plant must conserve water because the creek is the source of supply and may get very low during the summer months. The plan is to mix the fines dewatered by the Bird filters with sufficient crushed hand-picked lump and low-moisture crushed egg to keep the percentage of moisture within the desired limits.

Five Bird filters dewater the washed product from the tables and a sixth dewaters the table refuse. Water and fines from dewatering and sizing screens handling the


Elev 840'-6"
Elev 833'-1"
Elev 795'-0"
Floor elev 787'-3½"
Floor elev 762'-0"
Check valve
Solenoid
Sump pump 7B controlled by float switches; cap. 400 gpm
To pond
Main circulating pump 7A
Main circulating pump 7B
(cap. 4,000 gpm each)
Cleanout to floor drain
Float-actuated valve admits make-up water when operating water level drops below elev 776'-0"
LEGEND
Lines used for normal operation
Lines used during emergency by-pass
Lines used when feeding contents of emergency sump back into system
Lines used offshift operations
Fresh water
X Indicates cut-off valve

washed 5x¼ coal is pumped to a 236,000-gal settling cone.

● **Overflow water** from the settling tank is split and routed in an unusual manner. A portion over the first weir travels back to the sump for the main circulating pumps. The remainder, after flowing over a second weir, splits two ways—about 3,000 gpm to the air-pulsated wash boxes and 5,000 gpm to the table-supply line. That part of the latter not required by the tables goes to the two Bird polishers. The clarified water from the polishers joins the Bird-filter effluent flowing to a clean-water sump. From the sump, it is pumped to mix with the air-pulsated washer supply from the second weir of the settling-cone overflow.

While the objective of a closed water circuit has not been reached, the present build-up of solids requires only a small bleed-off to a sludge pond. Whether that practice will be permanent with the present equipment has not been determined.

A paddle mixer operated by two 40-hp motors does a thorough job of mixing the washed fines and crushed low-moisture lump and egg to produce uniformity of surface moisture in the 2x0 nut-slack. While the Bird filters are reducing moisture almost as much as expected, the high percentage of fines in the purchased coal has resulted in higher percentage of surface moisture than the goal set for freedom from freezing. Possibly more lump will have to be taken from the domestic market and crushed to increase the percentage of dry coal going into the mixer.

The preparation plant is being operated and coal dumped two full shifts and a part of a third. To date, the maximum output in one day has been 8,000 tons of prepared coal. Refuse removed in the picking and washing approximates 10% of the raw feed. In the Wheelwright and Price No. 1 mines, seven mechanical sections operate three shifts and 14 sections two shifts.

● **The preparation-plant operating crew**, including the mine-car dumper, consists of 45 men for each of two shifts and 31 men on the third shift. These third shift men do clean-up and maintenance after the coal run is completed. The crews for each shift include one mechanic and one electrician.

An operating manual covering every feature of the plant has been prepared and put into loose-leaf book form. The superintendent, E. M. Pace, therefore, has at his command a wealth of information on design, operation and maintenance of the equipment. Also a large chart was prepared to indi-

WATER-FLOW DIAGRAM—PRICE PREPARATION PLANT

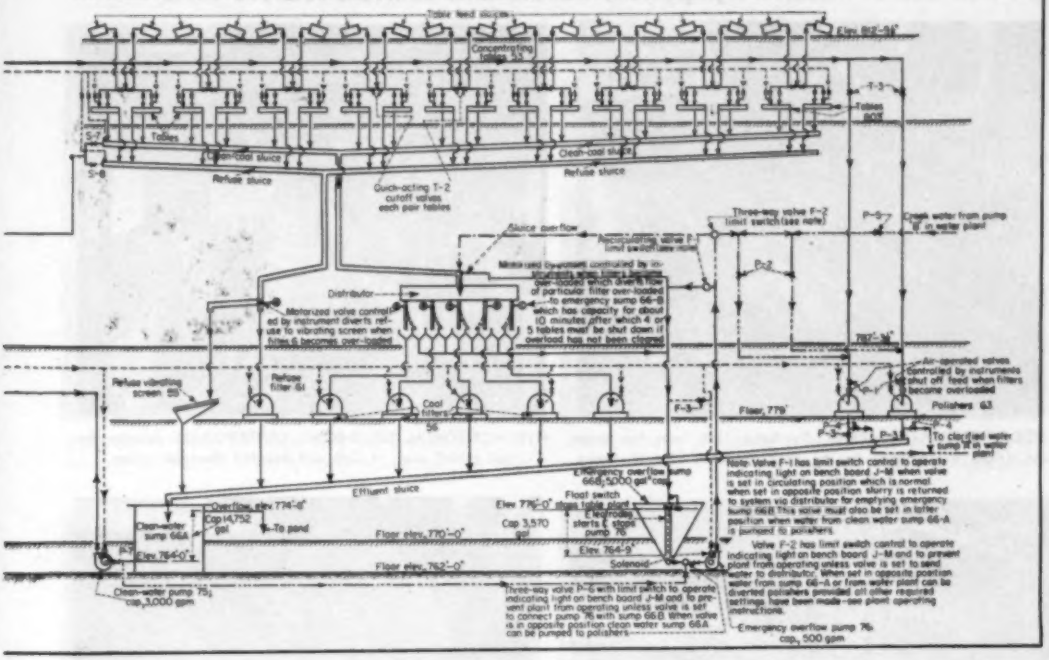


Table feed sluices
Concentrating tables 53
Elev 802-10"
T-3
Tailings sluice
T-4
Tables
S-7
Clean-coal sluice
Clean-coal sluice
S-6
Refuse sluice
Refuse sluice
Quick-acting T-2 cutoff valves each pair tables
Three-way valve F-7 limit switch (see note)
P-5
Creek water from pump 81 in water plant
Sluice overflow
Recirculating valve F-1 limit switch (see note)
Motorized valve controlled by instrument which shows flow over-loaded which diverts flow of particular filter over-loaded to emergency sump 66-B which has capacity for about 10 minutes after which 4 or 5 tables must be shut down if overload has not been cleared
P-2
Distributor
Motorized valve controlled by instrument diverts refuse to vibrating screen when filter is becomes over-loaded
787'-10"
Air-operated valves controlled by instruments to shut off feed when filters become overloaded
Polishers 63
Refuse vibrating screen 52
Refuse filter 61
Coal filters 56
P-1
P-3
Floor, 779'
P-4
P-5
To clear-well water pump 81 in water plant
Effluent sluice
Emergency overflow sump 66B, 5,000 gal cap
Float switch Elev 776'-0" starts & stops pump 76
Note: Valve F-1 has limit switch control to operate indicating light on bench board J-M when valve is set in circulating position which is normal when set in opposite position slurry is returned to system via distributor for emptying emergency sump 66B This valve must also be set in latter position when water from clean water sump 66-A is pumped to polishers.
Overflow, elev 774'-6"
Cap 14,752 gal
To pond
Clean-water sump 66A
Cap 3,570 gal
Floor elev, 770'-0"
Elev 764'-9"
Valve F-2 has limit switch control to operate indicating light on bench board J-M and to prevent plant from operating unless valve is set to send water to distributor. When set in opposite position water from sump 66-A or from water plant can be diverted polishers provided all other required settings have been made—see plant operating instructions.
Elev 784'-0"
Floor elev, 762'-0"
Solenoid
Clean-water pump 75, cap 3,000 gpm
Three-way valve F-6 with limit switch to operate indicating light on bench board J-M and to prevent plant from operating unless valve is set to connect pump 76 with sump 66B When valve is in opposite position clean water sump 66A can be pumped to polishers
Emergency overflow pump 76, cap., 500 gpm

Table I—Price Plant Belt Conveyors

Unit	Centers, Ft Horiz.	Centers, Ft Vert.	Centers, Ft Slope	Angle of Max. Slope Deg	Angle of Max. Slope Min	Angle of Max. Slope Sec	Width In	Belt Length Ft	Belt Speed FPM	Plies	Wt. Oz	Cover, Carrying Side,* In
ROM, dump to picking table	98	...	...	..	..	..	54	206	300	7	32	3/16
Rock belt to crusher	124	...	...	..	..	..	54	253	300	7	32	3/16
ROM retarding	856	211	881	17	47	50	48	1,786	360	8	42	3/16
Rock retarding	791	195	815	17	47	50	30	1,665	350	6	36	3/16
ROM, in main plant	134	23	135	9	35	5	48	282	400	7	32	3/16
Rock & refuse, in main plant	139	30	142	12	4	4	30	296	400	6	36	3/16
Raw fines from shaker	98	...	...	..	..	..	48	206	300	7	32	3/16
Raw fines to blending bin	280	59	288	18	..	..	42	601	450	7	32	3/16
Feeders at blending bin (five)	8	...	...	..	..	..	42	110	Var.[1]	4	32	3/16
Raw, blending bin to plant	305	63	312	18	..	..	42	649	350	7	32	3/16
Washery refuse	40	...	...	..	..	..	24	83	200	5	28	1/8
Washery refuse	163	53	171	17	59	..	24	355	250	5	28	1/8
Middlings	47	10	48	..	..	..	24	101	200	5	28	1/8
Stoker transfer	16	...	...	..	..	..	30	38	250	4	28	1/8
Fine raw, blending bin to plant	390	76	397	18	..	..	24	817	400	5	28	1/8
Fine raw, to table plant bin	14	4	15	18	..	..	24	37	400	5	28	1/8
Fines from filters	166	39	170	23	54	1	24	362	400	5	28	1/8
Fines, domestic	65	3	65	2	57	12	24	137	400	5	28	1/8
Fines, cross	43	15	46	19	41	18	24	99	400	5	28	1/8
Slack	74	11	74	8	38	..	42	150	350	7	32	1/8
Refuse from tables	54	...	...	..	..	..	24	118	200	5	28	1/8
Domestic	90	24	93	14	52	32	42	205	350	7	32	1/8
Foreign, dump hopper to plant	250	68	258	15	13	4	42	536	350	7	32	3/16
Rock & refuse, up hillside	965	187	983	17	..	..	30	2,001	550	C[2]	..	3/16
Rock, to refuse bin	297	92	311	17	13	12	30	640	400	6	36	3/16

*Cover, pulley side, all 1/16 in. [1]Variable speed, 17½ fpm to 62 fpm [2]Cord 300-type belt.

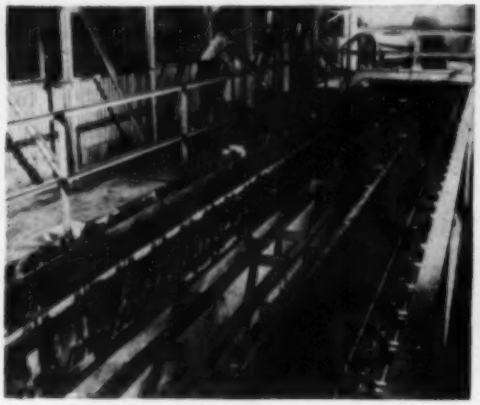
cate the starting order for plant units for six combinations of operation. A framed copy of this chart hangs near the main control board near the washers.

• **Electric motors** driving the plant total 153 and the connected horsepower is 3,726, including the six ½- to 30-hp motors in the water-treating plant. Motor voltage is 440 and the largest motor is a 300-hp unit driving the Pennsylvania Hammermill crushing lump and washed egg. Squirrel-cage motors are installed on all equipment except the mine-car feeder, Bird filters and Bird polishers, which use wound-rotor units.

Splashproof motors are installed on seven pumps and the eight Bird filters. Practically all motors are General Electric and the starting equipments are assembled in Cabinetrols of the same make. Principal exceptions as to make are Westinghouse 15-hp motors on the Brown-Fayro car retarders, a Louis-Allis 20-hp motor on the car shaker and one 20-hp U. S. motor on a turbine pump in the water plant.

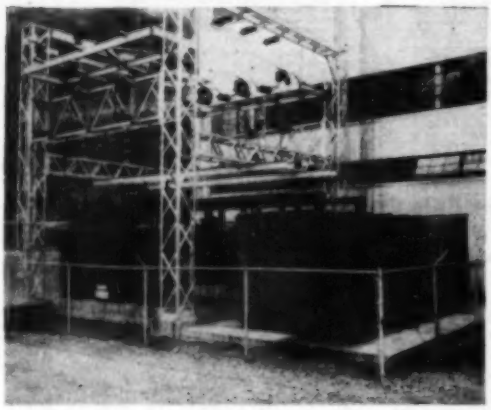
• **Power is purchased at 40,000 v** and the step-down transformers are owned by the coal company and installed at an outside substation and distribution center close by the preparation plant. Equipment con-

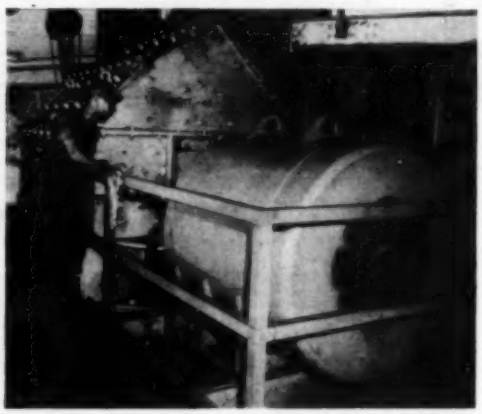
Efficient Use of Modern Equipment, Motors and Controls Feature Price



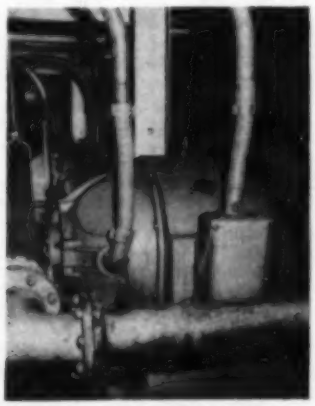
SIDE-TYPE BUCKET CARRIER distributes ¼x0 from the surge bin (right background) to the feed boxes of the 18 tables.

FIVE HORIZONTAL SOLID-BOWL CENTRIFUGALS dewater the ¼x0 tabled coal. A sixth unit dewaters the table refuse.



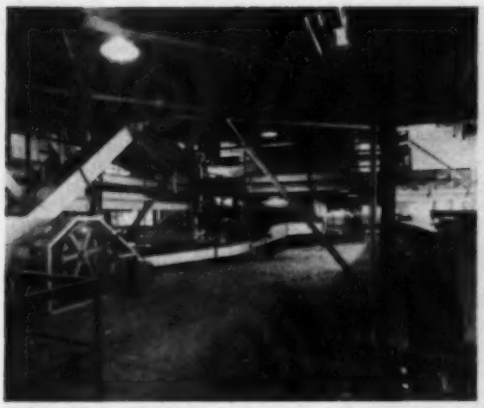


AC SUBSTATION owned by the coal company includes seven 500-kva transformers reducing from 40,000 to 440 v (one a spare) and a seven-section cabinet out from which go the 440-v feeders. The hammer mill (right) is driven by a 300-hp 720-rpm direct-connected motor.



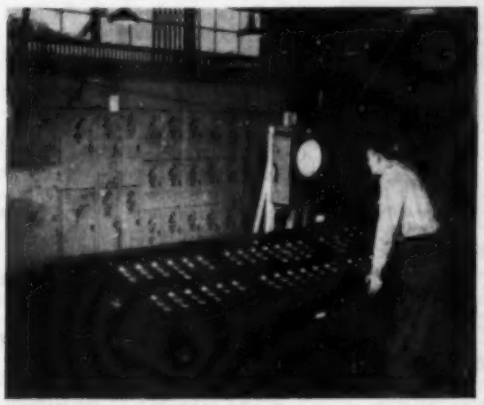
ONE OF FIVE 150-HP SLIP-RING MOTORS driving the centrifugal filters, which are started by resistances in both primary and secondary. Splashproof motors (right) with V-belt drives power the clean-water pump and emergency overflow pump.

CHARGING THE PLANT with lubricants for the initial start required 512 gal of oil and 155 lb of grease.



SECONDARY-REFUSE CRUSHER (left) has a V-belt drive. The belt conveyor (right) is driven by a gear reducer and roller chain.

SETTLING-CONE TOP is 50 ft in diameter and 71 ft above ground. Behind it is the west gallery with the coal and rock belts.



BENCH BOARD near the air-pulsated washers, and, the background, one of the eight control centers in the plant.

ENCLOSED SAFETY SWITCHES and dust-tight starters for the 20-hp car-retarder motors.

sists of seven General Electric 500-kva Spirakore transformers, one a spare. Buses and switch gear for the 440-v secondaries, together with the eight feeders to control centers, are mounted in weatherproof cabinets (G. E.) standing beside the transformers. Plant wiring is in rigid conduit and was done by the Allegheny Industrial Electrical Co., Pittsburgh, Pa.

Slip-ring motors (150-hp) on the Bird filters are started by a simple low-cost arrangement devised by Ward J. Heacock, electrical engineer, Link-Belt Co. In this plan there is a starting resistance and shunting contactor in both the primary and secondary.

Most of the plant motors are 1,800 rpm, and with this type the usual drive connection is a Link-Belt herringbone reducer and a roller chain. The pattern for shaking chutes and screen is a 900-rpm motor and a V-belt connection. Bird filters use 900-rpm motors and the Bird polishers use 1,800-rpm.

The 300-hp motor driving the hammer mill is a 720-rpm unit and is direct-connected. Washer-pump motors are 1,200 rpm and are connected to the pumps by V-belts. The drive for the reciprocating coal feeder under the rotary-dump hopper is a two-speed 1,200/400-rpm motor connected through an Allis-Chalmers Vari-pitch V-belt. Belt feeders under the blending bin, as well as a feeder under the foreign-coal hopper, have 1,800-rpm motors connected through Link-Belt P.I.V. variable-speed drives.

● **Roller chains are oil-bath lubricated** along with all the gear reducers. A survey by lubrication experts of the Gulf Oil Co. recommends 15 types of lubricants for the plant, and this survey estimated an initial charge of 512 gal of oil and 155 lb of grease to start the plant. Greased bearings are lubricated manually with a portable Alemite hand pump.

Circulating pumps serving the plant are 4,000 gpm each. The clean-water pump is a 3,000-gpm unit. The emergency overflow pump is 500 gpm and the slurry pump the same. All were manufactured by Allis-Chalmers. A LaBour Size 35 pump handles the spills in the plant and another of the same make is installed at a sump under the foreign-coal track hopper.

● **Steam for allaying dust** and heating the plant, service-center building and wet-refuse belt gallery is generated by two Brownell horizontal-return-tubular boilers, with Firite spreader-type Hoffman stokers installed on the ground floor

Table II—Price Plant Equipment List
Units Over ½ Hp

Unit and Number in Use	No.	Motors HP	RPM	Drive
Mine-car feeder	1	60	1,200	L-B reducer
Fo ary dump	1	25	1 200–400	L-B reducer
Dump flyga'e (2)	2	3	900	L-B & R. C.
ROM reciprocating feeder	1	30	1 800–900	A-C Va·ipitch
Rock reciprocating feeder	1	7.5	900–480	B-belt & spur gear
ROM belt conveyo·	1	15	1 800	L-B reducer & R. C.
Rock belt conveyor	1	10	1,800	L-B reducer
Shaker & picking table	1	20	900	V-belt
Rock crusher	1	150	720	V-belt
Crushed-rock apron conveyor	1	15	1 800	L-B reducer & R. C.
ROM retarding conveyor	1	125	1 200	L-B reducer
Crushed-rock belt conveyor	1	40	1,800	L-B reducer
ROM belt conveyor	1	40	1,800	L-B reducer & R. C.
Foch & efuse belt conveyor	1	25	1,800	L-B reducer & R. C.
ROM shaker screens	1	20	900	V-belt
Lump shaking-picking table	1	7.5	900	V-belt
Lump loading boom	1	10	1,800	L-B reducer & R. C.
Lump loading-boom hoist	1	6	....	Shaw-Box
Lump p.ckings crusher	1	75	720	V-belt
Clean-up flight conveyor	1	7.5	1,800	L-B reducer & R. C.
Raw-coal conveyor to magnet	1	15	1,800	L-B reducer & R. C.
Motor-gene ator set for magnet	1	10	....	Direct
Raw-coal belt conveyor	1	75	1,800	L-B reducer
Belt tripper	1	3	1,800	L-B reducer
Belt feeders (5)	5	3	1 800	L-B PIV variable & R. C.
Vibrating sc eens (5)	5	10	1 800	B-belt
Raw-coal belt conveyor	1	30	1 800	L-B reducer & R. C.
Shaking chutes	1	7.5	900	V-belt
Wash boxes (2)	2	75	1,200	Direct (blowers)
Wash-box auxiliaries	4	5	1,800	L-B gearmotor
Wash-box auxiliaries	6	1	1,800	L-B reducer
Washer-refuse belt conveyor	1	3	1,800	L-B reducer & R. C.
Washe -refuse belt conveyor	1	10	1 800	L-B reducer & R. C.
Middlings belt conveyor	1	3	1 800	L-B reducer & R. C.
Middlings crusher	1	15	1,200	V-belt
Washed-coal screens (2)	2	15	900	V-belt
Egg loading boom	1	10	1,800	L-B reducer & R. C.
Egg loading-boom hoist	1	6	....	Shaw-Box
Egg & lump coal apron conveyor	1	25	1 800	L-B reducer & R. C.
Egg & lump coal crusher	1	200	720	Direct
Collecting flight conveyor	1	25	1,800	L-B reducer & R. C.
Stoker vibrating screen	1	7.5	1 800	V-belt
S oker t·ansfer belt	1	3	1,800	L-B reducer & R. C.
S·oker loading-boom	1	7.5	1,800	L-B reducer & R. C.
Stoker loading-boom hoist	1	6	....	Shaw-Box
Fine-raw-coal conveyor	1	30	1,800	L-B reducer & R. C.
Fine-raw-coal conveyor	1	3	1 800	L-B reducer & R. C.
Sidebar carrier	1	15	1,200	L-B reducer
Screw feeders (18)	18	3	1,800	L-B gearmotor & R. C.
Dois er tables (18)	18	3	1,200	V-belt
Refuse vibrating screen	1	2	1,800	V-belt
Bird filters (5)	5	150	900	Bird
Fine-coal conveyor	1	15	1 800	L-B reducer & R. C.
Fine-coal cross belt conveyor	1	7.5	1,800	L-B reducer & R. C.
Slack belt conveyor	1	15	1,800	L-B reducer & R. C.
D ibble belt conveyor	1	3	....	Gearmotor
Paddle mixer (2)	2	40	1,200	V-belt & L-B reducer
Gate	1	5	1,800	L-B reducer & R. C.
Bird fi·ter	1	150	900	Bird
Refuse belt conveyor	1	5	1,800	L-B reducer & R. C.
Bird polishers (2)	2	75	1 800	Bird
Domes·ic-coal belt conveyor	1	15	1,800	L-B reducer & R. C.
Domes·ic-coal belt conveyor	1	5	1,800	L-B reducer & R. C.
Foreign-coal reciprocating feeder	1	7.5	1 800	L-B PIV variable
Foreign-coal belt conveyor	1	30	1,800	L-B reducer & R. C.
Car starders (4)	4	15	1,800	Brown-Fayro
Circulating pumps (2)	2	100	1,200	V-belt
Clean-water pump	1	100	1,200	V-belt
Emergency overflow pump	1	10	1,200	V-belt
Slurry pump	1	5	1,200	V-belt
Soills pump	1	10	1,200	Direct
Track-hopper pump	1	3	....	Direct
East refuse belt conveyor	1	125	1,200	L-B reducer
E st refuse belt conveyor	1	75	1,200	L-B reducer
Rock-bin ga·e	1	5	1 800	L-B electrofluid & R. C.
Fine-coal domestic conveyor	1	5	1 800	L-B reducer & R. C.
Ash-disposal elevator	1	3	1,800	L-B reducer & R. C.
B·oke·	1	15	....	.....
Air compressor	1	40	1,800	V-belt
Turbine pump	1	20	3,600	Direct
Turbine pumps (2)	2	30	1,800	Direct
Air compressor	1	3	1,800	V-belt
Back-wash pump	1	7.5	3 600	Direct
Sump pump	1	.5	1 800	Direct
Car shaker (fo eign coal)	1	20	1,800	R. C.
Hois· for car shaker	1	6.5	....	Yale
Boiler-fed pump (2)	2	7.5	3,600	Direct
Fo ced-draft b·ower	1	3	1,800	Direct

(L-B: Link-Belt; A-C: Allis-Chalmers; R. C.: roller chain)

in the main plant. The space heating is done with Trane unit heaters, all equipped with automatic thermostatic control. Dust-allaying jets are installed at the coal and rock feeders, at transfers of dry coal from one belt to another, at the mine-rock crusher, at the chute to the picking table and at each vibrating screen handling dry coal.

As an aid to operation and maintenance, and as a safety measure, pipe lines for various services are painted with identifying solid colors or stripes. For example, fire lines are red, drinking-water lines are green, black indicates waste water, and orange stripes air lines.

Since the service building, with bathhouse, is immediately across the highway from the plant, it was not necessary to install a shower and change-room in the plant itself. Toilet facilities are provided, however, by four commodes in the plant and one in the headhouse.

Steel and concrete are the construction materials used throughout the entire plant. The sides are covered with aluminum-colored Galbestos made by the H. H. Robertson Co. Foundations and the concrete blending bin were installed by the Rust Engineering Co., Pittsburgh, Pa. Plumbing and heating were contracted by Wayne Grouse, Inc., Pittsburgh, Pa.

• **Mining and preparation at Wheelwright** is supervised by the following:

J. T. Parker, superintendent of mines.

H. O. Zimmerman, chief engineer.

Arthur Bradbury, safety director.

E. M. Pace, superintendent, cleaning plant.

R. A. Jimenez, preparation engineer.

G. E. Leatherman, superintendent, power and mechanical department.

R. T. Greer, electrical engineer.

Kenneth Deal, mechanization engineer.

L. S. Becker, superintendent of buildings and grounds.

W. F. Hughes, general mine foreman, Wheelwright Mines 1, 2 and 3.

J. T. Anglain, mine foreman, Wheelwright No. 3.

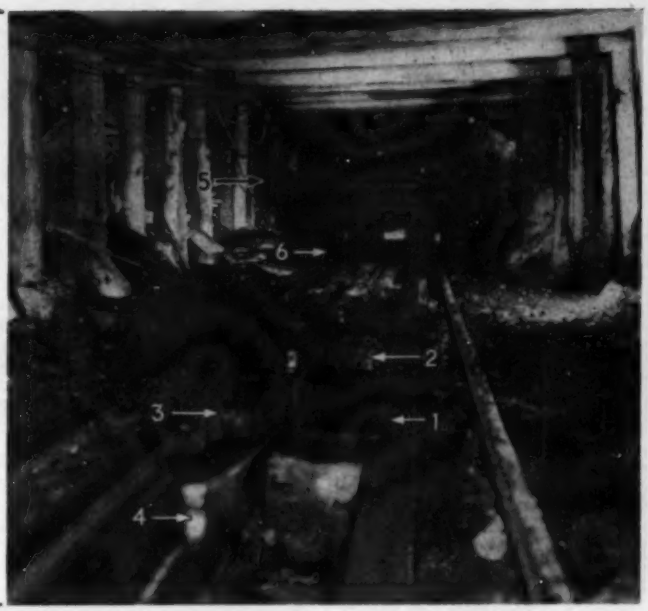
Pat Adams, mine foreman, Wheelwright Mines 1 and 2.

Leon Porter, general mine foreman, Price Mine No. 1.

To the whole Left Beaver Creek area this new plant, with its facilities for receiving and preparing foreign coal, is a big lift. It has brought the prospect of steady employment and all of the better things of living that go with it.

How the Spotter Works

UNLOADED SPOTTER in operation is demonstrated by Clyde Goodlin (background), master mechanic. Track unit (1) is held in place by lateral spacers, spikes and chains. Barney (2) is coming forward, propelled by hydraulic cylinder, and would be pushing a car in actual operation. As it comes forward it retracts the other barney (3) by means of a wire rope that runs around sheaves at far end of track unit. When Barney 2 is in full-forward position it overlaps Barney 3 by 1 in. An automatic sequence-control valve then transfers power from Barney 2 to Barney 3, which pushes car forward and against face of holding dog (4). Holding dog and dogs on barneys are depressed against springs by car axles as cars come forward and are returned by springs to positions shown to prevent backward drift of cars. Power unit (5) feeds hydraulic fluid under pressure to track unit through tube (6).



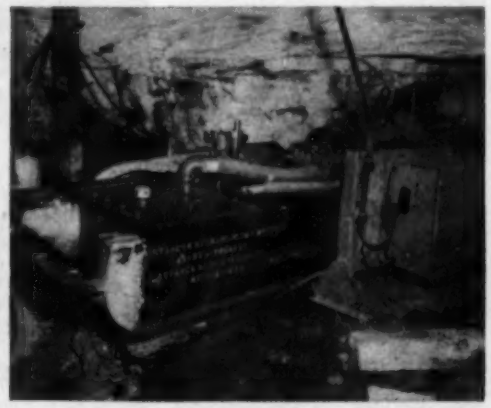
How New Hydraulic Spotter Helps in . . .

Cutting Trip-Changing Time

Goal: Eliminating Belt-Conveyor Stoppages
Method: Installation of New Hydraulic Spotters
Results: Uninterrupted Face Preparation, Smoother Haulage, Increased Productivity

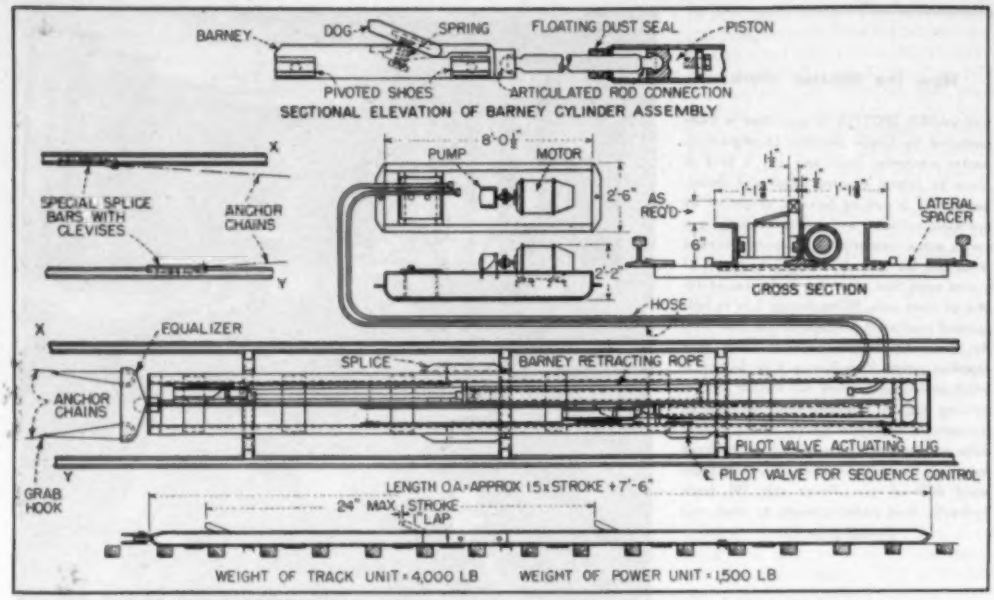
A MAJOR REDUCTION in trip-changing delays at the belt-conveyor discharge points of two developing sections has been achieved at Watson mine, Westmoreland Mining Co., Blairsville, Pa., through the use of hydraulic car

HAULAGE AND LOADING DELAYS are reduced by spotters. Trip leaves loading point while belt drops coal to next empty car.



COMPACT POWER UNIT has hollow side members to provide extra reservoir capacity for efficient cooling of hydraulic fluid.

New Car Spotter Helps Add 1½ to 2 Tons per Man-Day in Development Work



HYDRAULIC CAR SPOTTER is designed to meet conditions normally encountered in underground operations.

FLOOR VIEWS show dogs on barneys engaged in different types of lugs attached to cars to adapt them to chain hoist at outside car dump.

spotters. Trip-change time has been almost eliminated, thus permitting more nearly continuous loading and fuller productive use of shift time at the face.

Two Stamler hydraulic car spotters, designed by W. R. Stamler, Paris, Ky., and built by The Advance Machine & Mfg. Co., Beckley, W. Va., now are moving mine cars past the main-entry loading points of butt entries being developed with belt and chain-conveyor transportation.

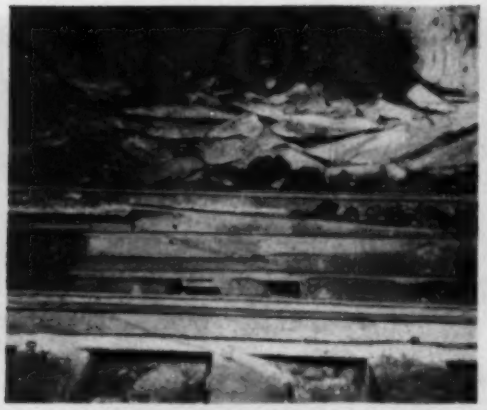
• **Developing Entries**—Each butt entry is a four-heading opening with the belt in the right center heading looking toward the face. Four chain conveyors in the headings feed two cross conveyors which carry coal from the outer headings to the beltway. The six conveyors are moved forward and new belt sections are added after each 250-ft advance. The butt entries, from which 350-ft rooms will be driven, are opened on 700-ft centers and will be up to 3,000 ft long.

From 14 to 16 men are employed in each of the two entries, including a supplyman, bratticeman, mechanic and car attendant. Two cutting machines and two loading machines prepare the face and load the coal into the conveyors in each entry.

Heretofore, the belt and the conveyors feeding it were stopped each time the locomotive arrived to pull loads away because the car-hoist rope had to be removed during the change-out. Trip length at one of the loading points is limited to eight loaded cars because of adverse grades, so an average of 20 trip changes per day is necessary. Placement of empties, however, has not interfered with loading because they are not pushed past the loading point but are fed to the end of the trip through a run-around.

Haulage studies at the loading point established that about 4 min per trip change was the rule. With 20 such changes per day, inevitable delays were introduced in face preparation because, when the conveyors stopped, the cutting machines also would be held up sooner or later by the unloaded coal at the face. In short, the more nearly continuous loading made possible by the reduction in haulage delays has added from 1½ to 2 tons per man-day to the former average of about 10 tons per man-day in development work. On a man-hour basis, it is estimated that from 14 to 16 man-hr per day, previously lost because

NON-STOP LOADING on curve is provided by gate in double-discharge chute. Hand wheel controls gate to run coal either way.



SHOP-MADE AUXILIARY DOG prevents shorter cars from drifting back with retreating barney, thus protecting retracting rope.

of delays, have been returned to productive effort.

● **Car-Spotter Operation**—The Stamler car spotter (patents issued or pending) consists of (1) a track unit which contains two barney assemblies with automatic hydraulic sequence control, and (2) a power unit with a drive motor, hydraulic pump, remote-controlled relief valve for monitoring the operation of the barneys on the track unit, and a hydraulic fluid reservoir. The two units of the spotter are connected by two hoses, a pressure hose and a return. The power unit is set in an out-of-the-way place to prevent it interfering with car loading.

The barneys on the track unit are offset longitudinally. Thus, one barney pushes the car half the desired length of travel, then transfers the car to the other barney for the other half of the stroke. The barneys overlap slightly at this transfer point, the rear barney ending its stroke slightly ahead of the starting position of the forward barney.

Force is applied only to the loaded barney. As the loaded barney is pushed forward by hydraulic pressure it retracts the unloaded barney by means of a wire rope which connects the two barneys and runs around sheaves at the rear of the track unit.

● **The new spotter introduces added smoothness** into the haulage system. With other methods of car-spotting the coordination of loading and haulage depended largely on the locomotive operator. He would place empties at a loading point, proceed to his other duties and then return to the first loading point when he thought the cars would be loaded and ready for him.

SECTION PRODUCTION and mine maintenance at Watson are supervised by Robert Stefanko (left), assistant foreman, and Clyde Goodlin, master mechanic.

If delays held up loading at the first place, the motorman would be forced to wait for a trip to be loaded or pull a short trip. Pulling a short trip might necessitate an extra visit to the place or result in the loss of some cars on that shift. With hydraulic spotters in service the locomotive merely takes away the available loads up to maximum trip length, and the spotter continues to push the trip up to its full capacity.

The hydraulic car spotters at Watson are powered by 15-hp Type SK Westinghouse motors with Ohio Brass Type BD magnetic starters. The pistons exert a maximum push of 20,000 lb over the 24-ft stroke to move the cars at a rate of 40 fpm. Relief valves protect the track unit from damage that might result if the locomotive rams the head end of the trip in approaching to pick up loads. A check valve prevents backward drift of the barneys at the ends of their strokes.

The car spotter operates when the car attendant closes a switch which controls the pressure setting of a relief valve at the pump. This valve by-passes fluid to the reservoir when the barneys are not moving since the pump and motor operate at all times, idling when the cars are standing.

● **Two-way chutes with deflecting gates** are installed at the ends of the belts to permit the belts to operate continuously without dropping coal between the cars. At one station the cars are loaded on a curve. Consequently, the discharge from the two-way chute is biased by metal deflectors to permit discharge from either chute into the cars on the curve.

Cars of two different sizes are in use at Watson. Therefore, one refinement has been added to the car spotters. Clyde Goodlin, master mechanic, installed an extra dog ahead of the track unit to receive the shorter car and prevent its backward drift to the regular holding dog on the unit. Otherwise the car would push the retreating barney back too fast, with the possibility of kinking the wire rope and cutting it.

Watson mine produces 1,600 tpd of low-sulphur by-product coal from the 39-in-thick Upper Freeport seam. Arthur Steel is superintendent and Clyde Goodlin is master mechanic. The mine comes under the general supervision of Paul W. Graff, president, and F. H. Coleman, vice president.

COMPACT SURFACE PLANT at Porter Tunnel eases supervision by placing all units and transportation under direct observation, as shown in this view from above the portal.

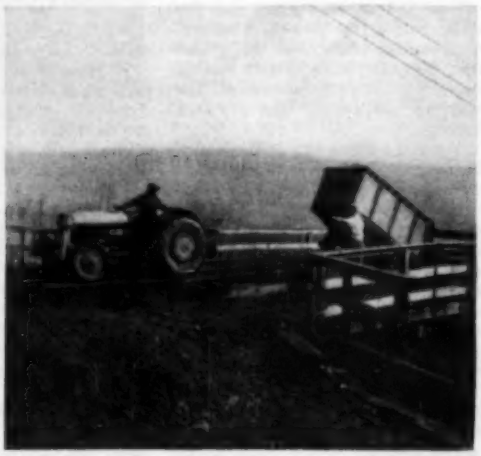
Modern Methods for Recovering Anthracite Feature . . .

Operations at Porter Tunnel

Philadelphia & Reading Opens New Mine To Produce From Large Anthracite Reserves — Sectional Tunnels Subdivide Mine for Better Development and Haulage

By E. F. YOUNG
Mining Engineer
The Philadelphia & Reading Coal & Iron Co., Pottsville, Pa.

TRACTOR with attached pushboards shuttles cars outside. Drainage ditch (left) is lined with half-sections of pre-cast pipe.



ALL-STEEL CARS are dumped through pocket for truck haulage to breaker. Cleaning plant footings are in place beyond pocket.

MAIN TUNNEL carries service lines to inner workings. In this section, roof is supported by car axles, 60-lb rail and lagging.

MORE EVIDENCE of anthracite's confidence in its own future is displayed in The Philadelphia & Reading Coal & Iron Co.'s latest project —the development of Porter Tunnel. Reserves of marketable anthracite, estimated at 10 million tons, now are opened for exploitation through the new tunnel, a 4,220-ft-long water-level opening.

The new opening is a cross-measure tunnel cutting 15 veins, 10 of which are minable. The coal stands in pitching measures in a 300-ft lift between the level of the new tunnel and depleted workings of Brookside colliery, which was abandoned by the company in 1938. The veins dip north and south, from 70 to 90 deg, to form Williamstown basin in the northern fork of the "fishtail" at the west end of the southern field. The south dip of the measures follows the southern limb of the anticline that forms Big Lick Mountain.

From geologic inference, the depth of the basin is estimated to be 2,550 ft, from the outcrops on the mountain at an average elevation of 1,550 ft to the axis of the basin 1,000 ft below sea level.

● **The history of mining** in this portion of the southern field, which is approximately 20 mi west of Pottsville, Pa., follows:

Brookside colliery was opened in 1868 in Lykens Valley Nos. 4 and 5 veins. Mining in these two veins continued until 1917, when three water-level tunnels were driven into the side of the mountain across the measures at an elevation of approximately 1,260 ft to recover coal in the overlying veins. During the life of Brookside, from 1868 to 1938, about 22½ million tons of prepared coal were shipped to market, and it is estimated that 36 million tons of marketable coal remain in the basin.

Operations in the three early tunnels and strip mining at the outcrops removed the first 300-ft lift from the veins in the basin, and the next lower 300-ft lift will be recovered through Porter Tunnel, which is directly under the middle tunnel of the overlying workings.

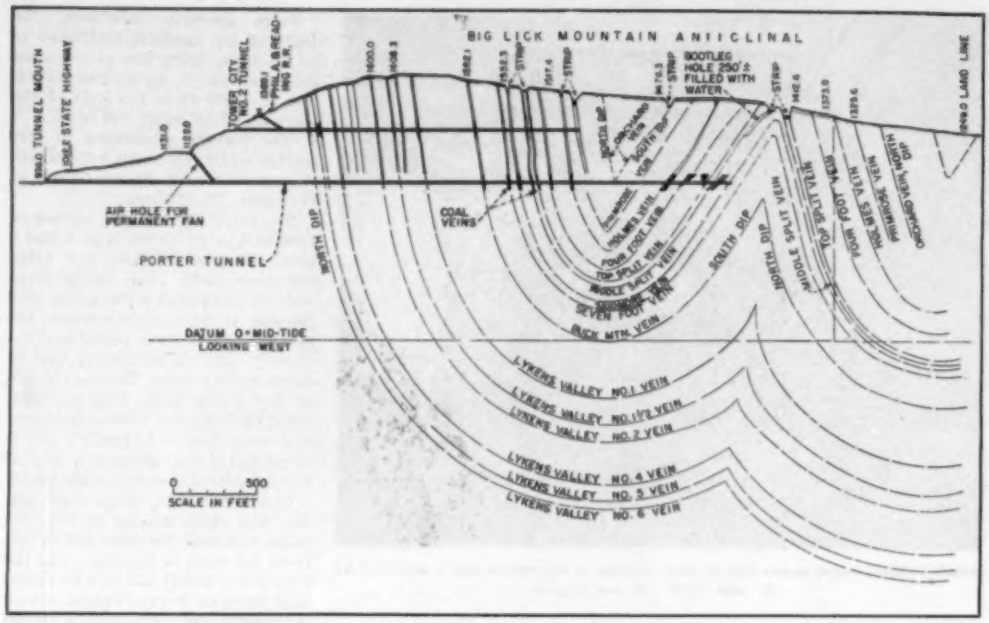
Tunneling Operations

On the basis of a detailed economic and engineering study of the property, Philadelphia & Reading approved the expenditure of approximately $2 million for driving the new tunnel and for other preliminary requirements at this opening. The new development was planned for efficiency now and

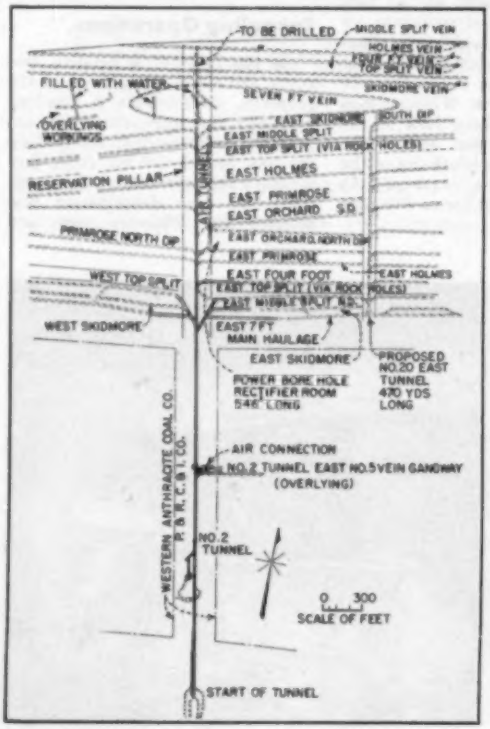
MUCKING CREW prepares to load out cut at face of main tunnel after laying rail. Four shifts drill and muck around the clock.

TIMBERMEN Lester Dinger (left), Dallas Hand and Joe Alutius stand a 3-piece set in West Skidmore gangway.

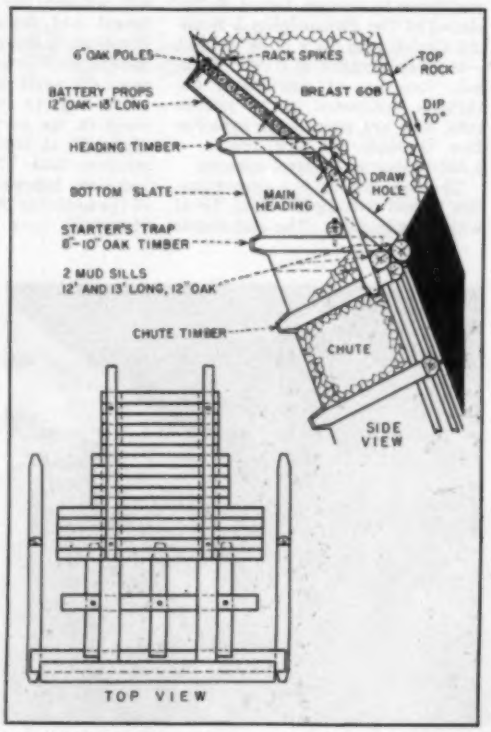
How 4,220-Ft Porter Tunnel Opens Up 10 Minable Anthracite Veins



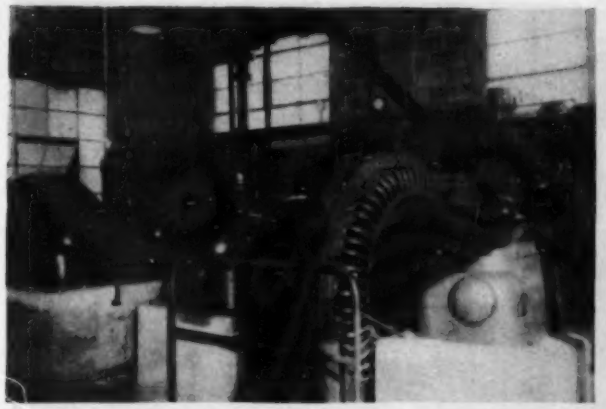
PORTER TUNNEL intersects 15 veins, 10 now minable, to open 300-ft lift in virgin reserves.



SECTIONAL TUNNELS from main haulageway in Seven-Foot vein will speed development and eliminate main tunnel haulage tie-ups.



LAY-DOWN BATTERY provides for safe release of broken coal in box when breast is finished.



TWIN AIR COMPRESSORS, each supplying 780 cfm at from 85 to 90 psi, feed 6-in airline in main tunnel. Room for two more units is available in compressor station.

AIR-OPERATED PUMP boosts water pressure in 2-in line for most efficient wet drilling.

VENTILATION DUCTS of spiral-welded 24-in pipe serve as returns from individual splits to fan at foot of airhole, which was driven in coal to old workings above.

utility in the future as mining progresses to lower levels, thus providing returns on the initial investment for some time to come.

• **To secure a solid face** from which the tunnel could be driven, about 20,000 cu yd of wet loamy material was removed from the hillside to expose a soft but stable red shale. This initial cut was made by company men and equipment in the summer of 1948. Rainy weather hampered the work by causing slides and fouling transportation, but the former problem was solved by sloping the sides and building shallow terraces on the contours of the cut. Transportation was improved by providing drainage ditches to carry off excess water.

In seeking a method to further stabilize the sides of the cut, company engineers consulted representatives of the Pennsylvania Department of Highways, who suggested planting a mixture of grasses to be followed by shrubbery after the grass had taken root. The present combination of grass, contour terraces and a drainage ditch around the top of the cut appear to have remedied the conditions.

On Sept. 30, 1948, the tunnel was started into the red shale on a plus 0.5% grade by 5 men per shift on a 3-shift basis. They drove the first 300 ft with air-operated picks and spaders because the material was too soft to permit the use of explosives. In the next 182 ft only light shots were used. For a distance of 330 ft from the portal, the tunnel is 18 ft wide at rail height, 14 ft wide at the collar and 9 ft clear above the rail. These dimensions leave adequate room for a lining to be added later.

A drainage ditch, 5 ft wide at the top, 3 ft wide at the bottom and 3 ft deep, was excavated along the west rib of the tunnel to provide a channel for discharging 20,000 gpm from the workings as the mine expands.

The roof in this portion of the tunnel is supported by 3-piece oak timbersets resting on mudsills. The timbers and mudsills are square, 12x12 in. Forepoling of ribs and roof was necessary in most of the initial 482 ft, at which point solid formations were met.

Here, F. V. Dormer & Co., Pottsville, Pa., tunnel contractors, took over the job of advancing the opening. The dimensions had been reduced to 14-ft spread and 8-ft height because this portion of the tunnel will not be lined. There was no change in the size (3x5 ft) of the ditch.

The contractor's men worked four 6-hr shifts per day, two mucking crews alternating with two drilling crews. The tunnel was advanced in 10-ft cuts, each round consisting of 26 holes charged with about 200 lb of 60% dynamite. The 4-man drilling crews, each having a chargeman, driller and two helpers, used

two pneumatic post-mounted drifters to drill and charge a round in from 5 to 6 hrs.

• **Wet drilling was used,** with water supplied from a deep well near the portal of the tunnel, and compressed air from two Ingersoll Rand compressors, each having a capacity of 780 cfm at from 85 to 90 psi. Compressed air enters the tunnel in a 6-in line, which is reduced to 2 in within 500 ft of the face. The water line parallels the air line, permitting the use of an air-operated booster pump in the water line to control water pressure for wet drilling.

Two 3-man mucking crews, each having a machine operator, a dresser and a miner, loaded out the cuts produced by the drilling crews and laid track on a 48-in gage. A track-mounted, 40-hp 440-v ac Conway mucking machine was used to load blasted material into all-steel cars, fabricated by Bethlehem Steel Co., which have a unit capacity of 150 cu ft.

A 14-ton General Electric battery-and-trolley locomotive pulls the mine cars in the main tunnel and in the coal gangways driven east and west from the tunnel. It operates in the tunnel from a 250-v dc trolley system which is fed from a m-g set in the compressor station. As additional haulage units are placed in service, other provisions for supplying haulage power will be installed. For battery-powered operation, the locomotive carries 99 Edison A8 cells with a combined capacity of 300 amp-hr.

The final step in completing the tunnel is advancing the drainage ditch. The ditch is completed in 100-ft sections because an air connection to the overlying tunnel in a coal vein pierced by Porter tunnel has made it possible to relocate the fan and remove the ventilation duct from the first 1,700 ft of the tunnel.

A double-drum hoist with hoe-type scraper removes blasted material from the ditch and stockpiles it for later loading by the mucking machine. The hoist is moved toward the face after each 100-ft advance of the ditch. Ditching holes are drilled 3 ft deep on 4-ft centers by a 3-man crew using 55-lb percussion drills, on a single-shift basis.

• **Ventilation is provided** by a 3-ft reversible fan driven by a 7½-hp 440-v ac motor. The initial position of the fan was at the portal, from where it delivered 6,000 cfm through the 24-in duct to the tunnel face. After the tunnel advanced 1,700 ft to the Lykens Valley No. 5 vein, an air hole was driven up through the coal to the overlying tunnel and the fan was moved to the foot of this hole.

From this position the fan exhausts through steel ducts from the tunnel and the workings in the coal seams. Each vein is ventilated by a separate split, necessitating a separate duct from each split to the fan. The tunnel and gangways are on intake air, with the return from each split passing through its individual duct, up through the air hole in Lykens Valley No. 5 vein and out through the old workings above. In each of the minable veins intersected by the tunnel, air connections are being driven off the tunnel ribs up the pitch to the overlying tunnel. As these air connections tap the upper tunnel it will be possible to remove the duct which now serves as a return airway from that particular vein, since the air hole then will serve as a return to the old workings.

Control of the volume of air entering each split is provided by automatic main doors and regulators in the tunnel.

PITCHING COAL, almost vertical, is drilled with "pony machine" by Leonard Krise from step broken coal in East Skidmore breast No. 4.

VENTILATION CIRCUIT to breast No. 4 is completed by John Remakus, as he "holes-through" in first breast heading.

W. D. MAURER (left), colliery superintendent; Peter Hino, mine foreman; Harry Loidich, P&RC&I safety inspector, and Milton Hale, safety engineer.

JOHN NEDEROSKIE (left), third shift fireboss, and Leon Tribble, rock foreman.

When the projected airways in each vein have been completed, permanent ventilation will be provided by a 50,000 cfm pressure fan on the surface, forcing air through a rock airway now being driven.

Coal Production

The breast-and-pillar system of mining is used in all veins at Porter Tunnel. Breasts are driven up the pitch 30 ft wide on 60-ft centers. Cross-headings for conducting air among the working places are driven through the 30-ft pillar between breasts at intervals of 60 ft, and are offset from each other on the two sides of each breast to prevent possible development of a line of weakness in the pillar coal.

Laydown batteries, as shown in the accompanying illustration, are used at the foot of each breast. To release the coal in the box when the breast has been driven to prescribed limits, the miner steps out of the main heading onto the starter's trap and takes the necessary measures to remove three planks which cover the drawhole, thus permitting the coal to run from the box, down the chute and into the car on the gangway below.

• **Main-haulage gangways** are being driven off the main tunnel in the Seven-Foot vein for the entire length of the property. Turnouts, long enough to accommodate 40 cars, are provided off these wing tunnels near their junction with the main tunnel, thus preventing standing trips from interfering with mainline haulage. Gathering locomotives, which are to be added to the transportation system as production increases, will pull cars to the turnouts, from which mainline locomotives will pull trips to the mouth of the tunnel.

Sectional tunnels will be driven parallel to Porter Tunnel across the measures to subdivide the property. The sectional tunnels will be turned off the main haulageway in the Seven-Foot vein on 1,200-ft centers measured east and west from Porter Tunnel. Coal gangways will be turned into the minable veins off these sectional tunnels and will be driven 600 ft east and west of the sectional tunnels.

To recover the reserves above the level of Porter Tunnel, 3 mi of rock tunnel and 22 mi of coal and rock gangways will be required.

Plans for Preparation

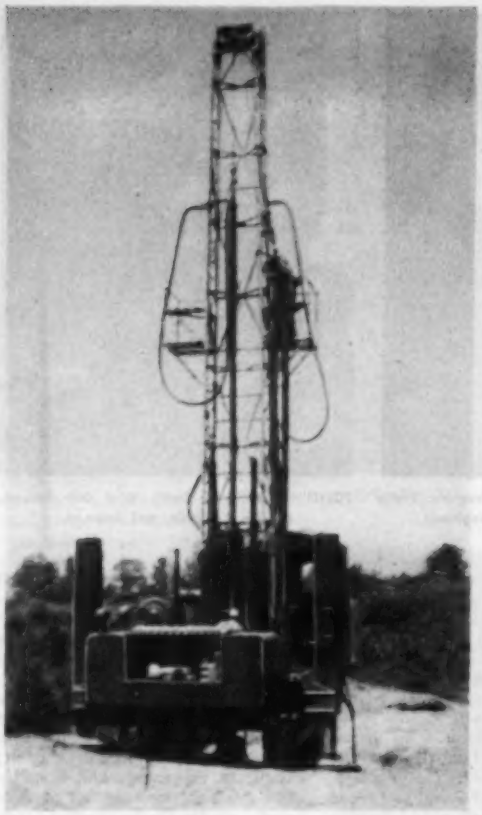
Coal produced in development work now is truck-hauled to Westwood breaker, but foundations for a 500-tph rough-cleaning plant are being set on the centerline of the tunnel, 600 ft outby the portal. The plant will include manual picking tables and conventional No. 1 rolls. Adverse grades prevent the construction of a rail spur to the plant, so it is planned to transport the plant product on a 42-in belt conveyor to an existing railroad on Big Lick mountain, a distance of 1,900 ft on a grade of 16 deg. Westwood breaker or some other preparation plant will receive the rough-cleaned coal for final conversion to standard anthracite.

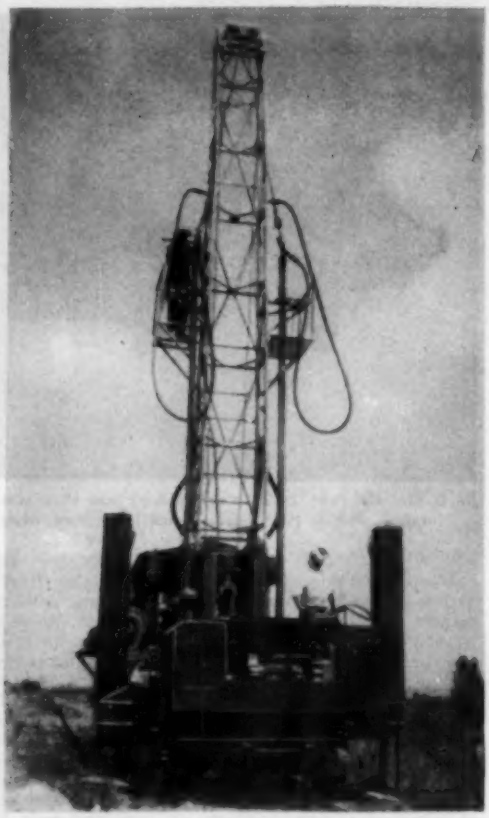
Surface facilities also include a 45x94-ft combination office and storehouse; a 32x99-ft utility building that houses the mine foreman's office, ambulance room, first aid room, washroom and lamphouse; a surface shop; compressor station; explosives magazine; and a boiler room for colliery heat, all of fireproof, cinder-block-and-steel construction.

• **Effective training** of the working force in the skills of pitch mining is carried forward by W. D. Maurer, colliery superintendent. Mr. Maurer now is building a highly-trained nucleus for the future working force by teaming experienced pitch miners with young men who have an aptitude and desire for this exacting work.

• **Major policies** affecting Porter Tunnel are formulated by R. E. Taggart, president, assisted by G. A. Roos, vice president-operations, and E. G. Fox, general manager. Technical planning for the new operation is done under the direction of W. C. Muehlhof, chief engineer; A. Brown, electrical engineer; L. D. Lamont, assistant mechanical engineer, and E. F. Young, mining engineer. Plans are executed by the company's Pottsville Division, supervised by D. E. Ingersoll, division superintendent, and W. G. Williams, division engineer.

Big Rotary Machine Speeds Overburden Drilling and Cleans Holes With Air

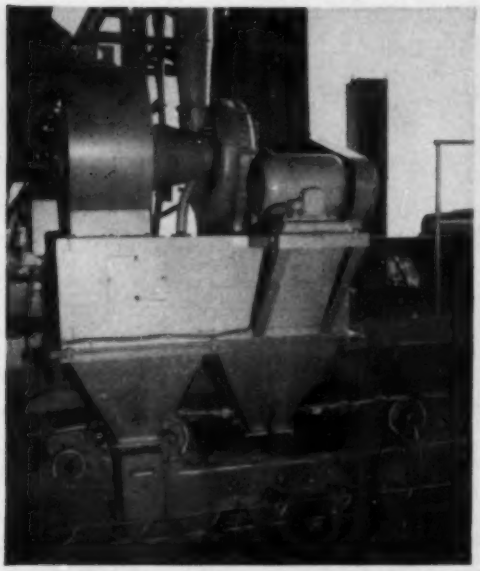




LEVELED ON A SLOPE by hydraulic jacks, the big drilling machine cuts an arrow-straight blast hole through soil, shale, sandstone and limestone at rate of 53.24 ft per hour of actual drilling time. Adding and pulling drill bars (right) takes a little over 1½ hr per shift. Bars come in 10- and 20-ft lengths.

BIT WEAR IS REDUCED by flushing drill with air instead of water. Bit on left drilled 5,774 ft before being replaced. Bit on right is new and bigger. Bit cost averages about 2.5c per foot of hole drilled; power cost, about $5 per shift.

ROTARY ROCK BIT with teeth on three cutting cones is ready to start a new hole. Steel hood funnels air-borne cuttings upward into dust separator, where fine dust is collected in a hopper for manual dumping. Coarse particles are dumped continuously.



DUST SEPARATOR piles cuttings on the ground alongside the machine. Suction air is discharged through stack. Exhaust fan provides suction that cleans bottom of hole and draws cuttings up through drill hole and into separator.

CONTROLS ARE CENTRALIZED in operator's cab, which is enclosed for protection in cold weather. C. C. Woolsey, superintendent of drilling and shooting for Enos, stresses simplicity of operation. Two men make up the drill crew.

Better Overburden Drilling

New Rotary Drilling Machine Working on Enos Strip Properties Sinks Blast Holes at High Speed—Air Flushes Hole, Reducing Bit Wear and Eliminating Need for Water—Hydraulic Jacks Level Machine in Rough Terrain

A NEW ELECTRIC ROTARY DRILL, originally designed for quarrying and now making its way into coal stripping, sank drill holes at an average of 53.24 ft per hour of actual drilling time in August, 1950, the first full month of operation after its installation at the stripping properties of The Enos Coal Mining Co., Oakland City, Ind.

In setting up this mark, the machine cut 6¾-in vertical holes in the overburden up to 71 ft deep. Average hole depth was 54.57 ft. Recently, hole diameter was increased to 7⅞ in, with no decrease in speed of penetration. Bit cost has averaged about 2.5c per foot drilled; power cost, about $5 per 7¼-hr shift. Maintenance costs have been low.

● **The new drill** is the first of its type ever used in coal stripping, Enos officials point out. Its installation adds another achievement to the company's long list of "firsts" stretching back through the years—first to shoot with liquid oxygen, first to haul coal from pit to tipple in trucks, and first to drill highwalls horizontally. This record is a mark of open-minded, enterprising management, always on the alert for new ideas, new machines and new methods.

In a 65-ft highwall, a typical overburden cross-section at the Enos mines includes 12 ft of soil, 10 ft of soft sand, 20 ft of hard shale, 15 ft of sandstone, 4 ft of limestone and 4 ft of shale and stone. Drill operators working on the highwall report that their new machine cuts limestone almost as fast as soft shale.

The new drilling machine, a 58-BH Heavyweight Champion built by Joy Mfg. Co., drills an average of six 64-ft holes per shift against two similar holes for a churn drill. Two men, an operator and helper, make up the crew for the big new machine.

● **Drill feed** for the Joy Heavyweight is hydraulic through twin cylinders, with continuous rotary pressure-cutting rather than percussion. Four feed stages are available. For top dirt, pressure is about 500 lb per square inch; for shale and sandstone, 550 to 600 lb; for limestone, about 625 lb. Top dirt must be drilled slowly to avoid choking the hole and clogging the air jets in the bit.

Hughes Tri-Cone rotating rock bits, Serial Type OSC and OWC, are used with the drill. At Enos, the first and second bits used were 6¾ in in diameter. They drilled 5,774 and 5,008 ft respectively before being replaced. When the bits were removed, bearings still were good and teeth on the perimeter of the cones were in fair condition, but teeth from the axis to the perimeter showed considerable wear. The third bit, now in use, is

What a Time Study Showed About the Big Drill

Operations	7¼-Hr Shifts Aug. 2 (Minutes)	Aug. 3 (Minutes)	Aug. 4 (Minutes)
Tramming	14.26	10.52	16.93
Leveling	16.12	36.53	25.22
Drilling	217.93	208.46	223.76
Adding drill bars	40.33	46.32	37.92
Pulling drill bars	59.87	51.88	53.95
Raising jacks	7.25	12.69	8.22
Preparation	5.00	....	3.76
Oiling compressor	0.74	....	....
Talking to visitors	3.00	....	....
Tightening drill stem	2.70	....	....
Tightening packing	1.84	....	....
Inspecting bit	2.22	3.00	0.98
Repairing swivel guide	32.12	....	....
Eating lunch	32.00	31.00	39.00
Greasing	....	25.00	15.00
Talking about jacks	....	2.22	....
Personal needs	....	3.00	....
Working on Rotoclone	....	2.96	1.21
Waiting for shooters	....	....	2.03
Loosening stuck drill bar	....	....	5.02
Summary, Three Days' Work:			
Total time working (minutes)	435.00	435.00	435.00
Total time drilling (minutes)	393.16	397.36	388.21
Ratio, drilling to working (per cent)	90.38	91.35	89.24
Total depth drilled (feet)	363	350	380
Depth per hour of actual drilling time (feet)	55.42	52.87	58.73
Depth per hour of working time (feet)	50.07	48.28	52.41

How the Big Drill Turns Out Work

SUMMARY FOR AUGUST, 1950	
Shifts worked (7¼ hr)	23
Holes drilled	130
Total depth drilled (ft)	7,094
Average depth of hole (ft)	54.57
Actual drilling time as per cent of total working time	80
Depth drilled per hour of actual drilling time (ft)	53.24
Depth drilled per shift (ft)	308.43

7⅞ in in diameter. Operating data on it are not yet available, though, as stated earlier, increasing bit diameter has not reduced cutting speed.

Enos has on hand enough drill rods, together with 2-ft reamer, bit holder and bit, to drill as deep as 85 ft. Thus far, the deepest hole went down 71 ft. Rods are available in 10- and 20-ft lengths. Enos has four 20-ft lengths and one 10-ft length. The first string, when a new hole is being started, adds up to 30 ft of rod, plus reamer, bit holder and bit.

• **Pressurized air and suction** combine to remove cuttings from the hole. Pressurized air, blown down through the drill string, emerges at the bottom of the hole through three jets inside the bit. This blast serves three purposes: (1) it cools the bit, thus eliminating the need for water and the danger of freezing in cold weather; (2) it forces fine cuttings from between the bit and the wall of the hole; and (3) it blows rock chips out of the path of the bit so that they do not have to be ground up. With air flushing the hole continuously, there is no need for costly water lines or water trucks. Air at 80 to 95 lb pressure is provided by a compressor installed at the front of the machine. The compressor has a 125-hp motor built, like all other motors on the machine, by Westinghouse.

Suction for removing cuttings from the hole is provided by an American Air Filter Co. Rotoclone, which is built onto the side of the machine. Drill operators report that the suction, induced by an exhaust fan and a 5-hp motor in the Rotoclone, is 10 times greater than the blowing pressure from the air jets. The suction draws the cuttings up to the collar of the hole through a steel-plate hood-and-funnel suspended above the hole from the underside of the machine, and thence through a rubber hose into the Rotoclone. The Rotoclone traps the cuttings and exhausts the cleaned air through a stack. Chips and other coarse cuttings are deposited continuously in a pile at one side of the machine. Fine cuttings are collected in a hopper and are dumped manually from time to time.

Three 4-ft jacks, powered by a 5-hp motor delivering up to 800 lb of hydraulic pressure, make it easy to level and operate the machine on steep slopes. Two of the jacks are at the front corners of the machine. The third jack is centered at the rear. With mast elevated to its full 38 ft and with jacks and Rotoclone in place, the machine is 27 ft long and 11 ft 6 in wide. The operator, watching latitudinal and longitudinal water levels inside the cab, levels the machine by adjusting a separate valve for each jack.

Tramming speed of the 58-BH ranges up to 5 mph. The 40-hp drilling motor provides power for tramming.

A second Heavyweight Champion, now on order for Enos, is being built to specifications based on experience with the first machine. Crawlers on the new drill will be longer and will be 36 instead of 16 in wide. Larger, heavier axles will be installed. Though Joy makes the machine available with gasoline or diesel engine, Enos will stick to electric power.

• **The drilling and shooting pattern** on Enos properties was worked out by C. C. Woolsey, superintendent of drilling and shooting. In a typical 65-ft overburden, horizontal holes are drilled 50 ft deep on 20-ft centers about 3 ft above the coal and two parallel rows of vertical holes are drilled on 24-ft centers in a staggered pattern. The first row of vertical holes is drilled 15 ft back from the edge of the highwall and 42 ft deep. The second row of vertical holes is sunk 33 ft back from the highwall edge and 48 ft deep.

Enos makes its own liquid oxygen and cartridges for shooting. Horizontal and vertical holes are loaded simultaneously and fired with Hercules electric blasting caps in groups of 10 horizontal and 16 vertical holes. Delay caps fire the end holes, both horizontal and vertical, to avoid spoiling holes already drilled for the next adjacent shot. Also, delay caps with lighter charges are used in horizontal holes when shots are very close above the coal. The average efficiency ratio of shooting is 6 yd of overburden for every pound of explosive.

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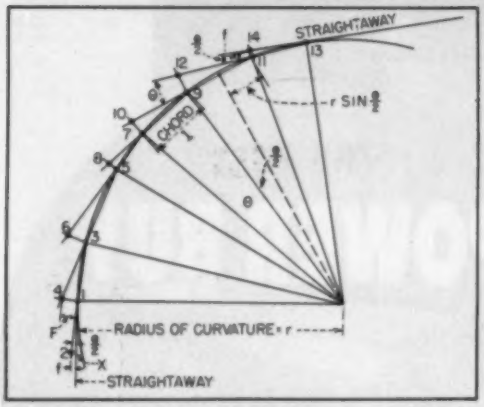

FIG. 1—OFFSET PLUGS, carefully installed at precalculated distances, provide control for underground curves.

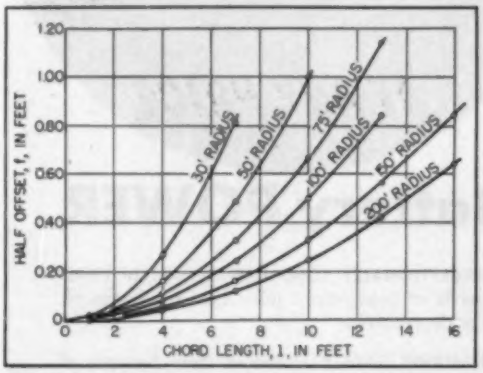

FIG. 2—HALF OFFSETS are used at tangent points where curve joins and leaves straightaway.

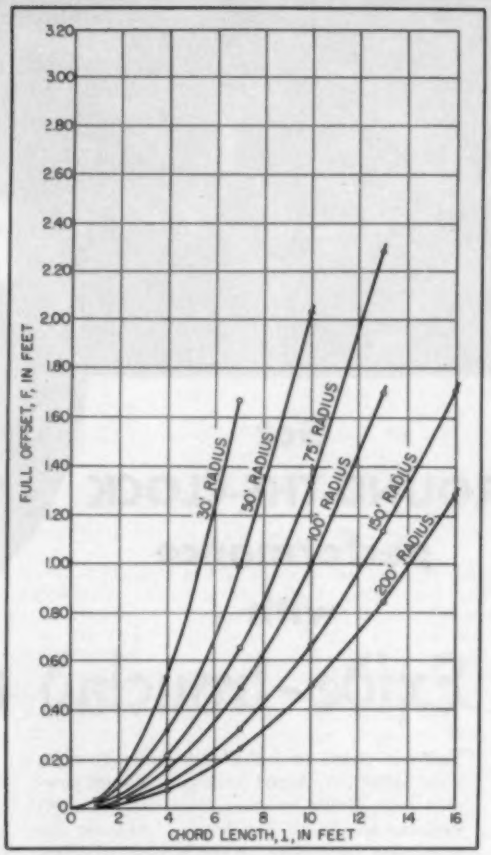

FIG. 3—FULL OFFSETS for various chord lengths and several radii of curvature.

Controlling Underground Curves With Offset Line Plugs

By DANIEL C. SHEWMON, Mining Instructor
West Virginia Institute of Technology

SINCE MILITARY DEMANDS for technical personnel probably will limit the number of engineers available to industry, here is a suggested method of curve control that can be applied by the section foreman or a conscientious machine man with information supplied by the engineers. The method will permit driving a curve of any predetermined radius, regardless of the length of cut. Also, plugs will be provided at the face to maintain proper curvature. Surveyors would be needed only to check the accuracy of control by taking spot detail after half the curve has been driven, or when straightaway plugs are needed at the end of the curve.

The formulas to be used by the engineers in calculating data for the foreman or machineman are as follows:

$$\Theta = 2 \arcsin \frac{1}{2r}, \quad (1)$$

where Θ is the angle subtended by the chord (1), in feet; and r is the radius

(*Continued on* p 120)

EASIER TO SEE...SAFER TO USE

U.S. Royal Gold Cables

These mine trailing cables have a golden yellow color, for high visibility. They provide new highs in safety —without loss in efficiency.

The jacket is made of tough *pressure-cured* Neoprene —highly resistant to abrasion, cutting, heat, moisture, and oil. Beneath the jacket, a strong cotton braid covers the insulation.

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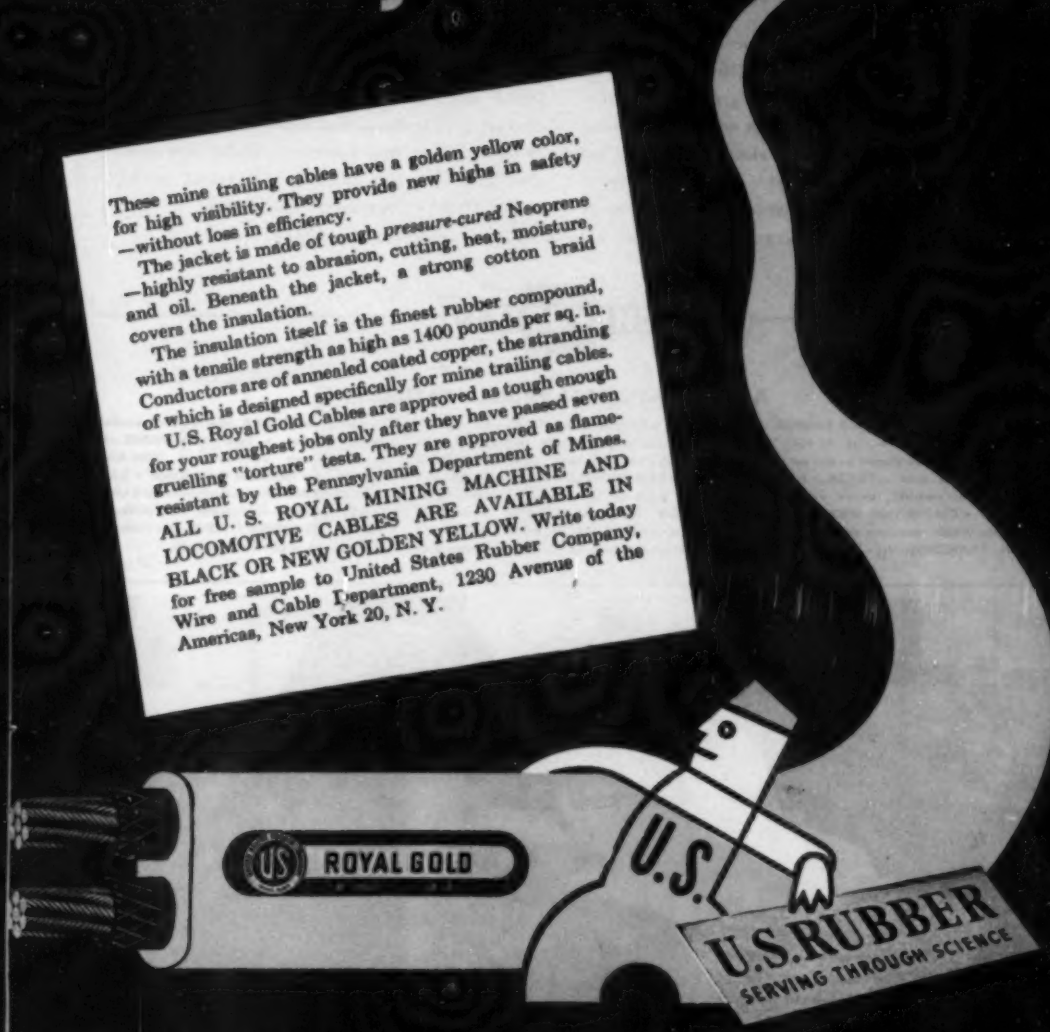
ALL U. S. ROYAL MINING MACHINE AND LOCOMOTIVE CABLES ARE AVAILABLE IN BLACK OR NEW GOLDEN YELLOW. Write today for free sample to United States Rubber Company, Wire and Cable Department, 1230 Avenue of the Americas, New York 20, N. Y.



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BY THE PENNSYLVANIA DEPARTMENT OF MINES

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Better before...now better than ever

America's best truck investment is an even better one for '51! Yes, this latest line of Advance-Design trucks combines the greatest of Chevrolet's traditional advantages with new features and improvements that make your dollars go farther than ever! Along with outstanding power and economy, finest construction and superior handling ease, Chevrolet Advance-Design trucks offer new, improved-design brakes, new Ventipanes, and Chevrolet's new cab seats—plus a host of other features that mean increased value to owners. See your Chevrolet dealer and look over this new line of 1951 Chevrolet trucks today. They're "best buys" every one!

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ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINES—the 105-h.p. Loadmaster or the 92-h.p. Thriftmaster—to give you greater power per gallon, lower cost per load • POWER-JET CARBURETOR—for smooth, quick acceleration response • DIAPHRAGM SPRING CLUTCH—for easy-action engagement • SYNCHRO-MESH TRANSMISSIONS—for fast, smooth shifting • HYPOID REAR AXLES—for dependability and long life • NEW TORQUE-ACTION BRAKES—for light-duty models • PROVED DEPENDABLE DOUBLE-ARTICULATED BRAKES—for medium-duty models • NEW TWIN-ACTION REAR BRAKES—for heavy-duty models • NEW DUAL-SHOE PARKING BRAKE—for greater holding ability on heavy-duty models • NEW CAB SEATS—for complete riding comfort • NEW VENTIPANES—for improved cab ventilation • WIDE-BASE WHEELS—for increased tire mileage • BALL-TYPE STEERING—for easier handling • UNIT-DESIGN BODIES—for greater load protection • ADVANCE-DESIGN STYLING—for increased comfort and modern appearance.

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1 SAFE

Willison Automatic Couplers require no manual assistance . . . no need for men to go in between cars to couple or uncouple a Willison Automatic!

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All Willison couplers have the same contour . . . can be coupled at either end of car or locomotive . . . no time-consuming reversing is necessary.

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Close coupling of Willison couplers eliminates damaging slack . . . permits higher speeds with maximum stability . . . reduces surging and spilling.

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Two parts, the head and the lock, do all the work on every Willison coupler . . . take the shocks and strains to protect cars and locomotives from damage.

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Over 50,000 Willisons speed handling and cut costs in mines and industrial plants everywhere. Why not specify Willison Automatic Couplers for your haulage needs?

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NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

WILLISON AUTOMATIC COUPLERS • NACO STEEL WHEELS • NACO STEEL LINKS and SWIVEL HITCHINGS

Controlling Underground Curves . . . From p 116

of curvature in feet (Fig. 1). The chord, which corresponds to the length of cut, and the radius of curvature are known quantities.

(2) Full offset (F) $= 1 \tan \theta$

(3) Half offset (f) $= 1 \tan \frac{\theta}{2}$

Plot full offsets and half offsets against chord lengths for the selected radius of curvature, as shown in Figs. 2 and 3. If offset values for several commonly-used radii of curvature are computed, as in the accompanying charts, a store of information is available for future use. The full offset and half offset, for the length of cut commonly used and the radius of curvature selected, can be read from the charts.

Underground, place Plug No. 1 (Fig. 1) at the face and on centerline at the tangent point or start of the curve. With the aid of a transit or by eye mark a fine point, X, on the roof, back down the entry and on centerline, a distance of the average curve cut.

Measure carefully the distance from No. 1 to X, and on the half-offset curve find the half offset for this distance. From X and at right angles to the entry centerline, measure off the half-offset and place a nail. Remeasure for a check. Line 2 to 1 is the centerline for the first cut, which is taken out.

After the first cut, place Plug 3 at the new face, and in line with Plugs 2 and 1. Measure distance 3 to 1 and from the full offset curve, determine the full offset, which is proportional to the depth of the first cut. Lay off the full offset from Plug 1 at right angles to Line 2 to 1 to 3 for the location of Plug 4. Line 4 to 3 is the line for the second cut. All the remaining cuts use the full offset line, the final straightaway plugs the half-offset.

The foreman can notify the engineers for a check survey after a predetermined number of feet of chord has been advanced. For any given curve, the length of arc between tangent points (1 and 13 in the diagram) may be calculated, and then measured underground. When the cuts have advanced this far, the half offset can be used again, giving line for the first or even second straightaway cuts Or, where fine accuracy is needed the engineers should put in new line control at the tangent point from the traverse continued around the curve.

Nails, not spads, should be used in the curve plugs and then hammered flush or pulled out when no longer needed. The engineers will then be able to find their own traverse spads without confusion. Since the chord lengths are so short, accuracy is further assured by using a hole deep enough to contain and protect the nail from damage from equipment and hard hats. Because of the small interplug distance, a bent nail will throw the curve line off.

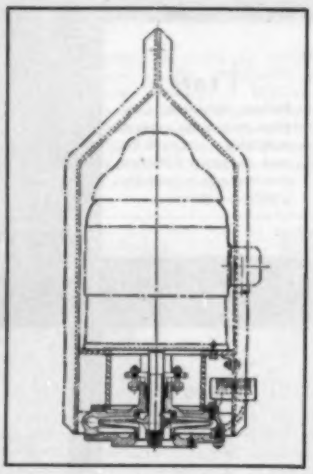
All chord lengths should be equal for a perfect curve. However, any interruptions, such as falls, clay veins or halfrounds, which cause a short chord, will not materially affect the shape and accuracy of the curve if the succeeding chord (cut) is longer than the average chord by about half the difference between the short chord and the average chord.

In laying track around this curve, the trackman can utilize the inside curve plugs for track centerline (Plugs Nos. 1, 3, 5, 7, 9, 11, and 13). Should the track be laid off-center from the entry, the plugs can be started on the track centerline, and the entry driven off-center.

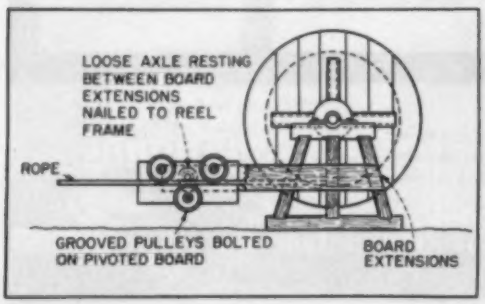
Shop-Made Pump Cradle Simplifies Vertical-Shaft Dewatering

DEWATERING OPERATIONS often require special equipment to cut the otherwise burdensome costs involved, writes Paul C. Ziemke, Oak Ridge, Tenn. Dewatering vertical shafts is materially expedited by using the best in vertical-type rotary pumps with electric drives, he suggests, in describing the shop-made pump cradle shown in the accompanying drawing. Such units suspended by a hoist cable will operate almost 100% of the time, with interruptions necessary only for the addition of new lengths of discharge pipe. The power cable is temporarily attached at intervals to the hoist cable and is usually fed from a reel with provision for slip-ring feeding.

The pump cradle is built of 2x4-in channel iron bent to shape by heating in a blacksmith's forge or oxyacetylene flame to conform to the design of the pump. The method of joining is optional, but most operators prefer bolting for easier dismantling. A 1-in hole in the neck provides an opening for the pin of the cable clevis. The base is fabricated from the same channel iron, inverted, to match the holes in the centrifugal pump. Angles supporting the upper section of centrifugal pump frame and bearing guide are attached to holes flame-cut in the vertical members.



THIS PUMP CRADLE, designed for shaft dewatering, was built on the job.

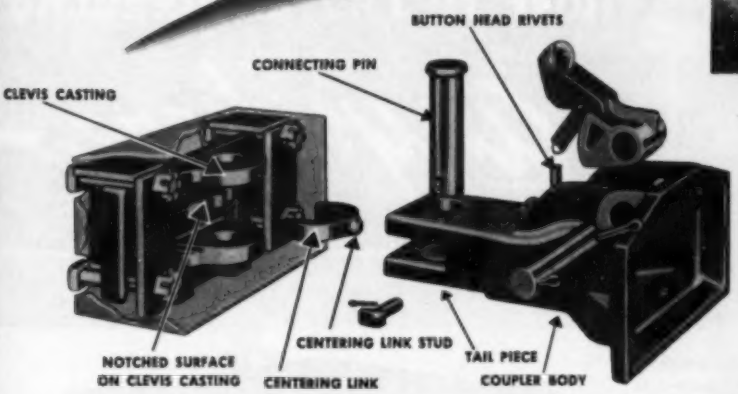

LOOSE AXLE RESTING BETWEEN BOARD EXTENSIONS NAILED TO REEL FRAME
ROPE
GROOVED PULLEYS BOLTED ON PIVOTED BOARD
BOARD EXTENSIONS

Removes Reel Kinks from Rope

BUILT for removing reel kinks from wire rope, this unit has been successfully used at a gold-silver mine in central Mexico, according to *Engineering and Mining Journal*, to prepare steel wire rope for an incline hoisting system connecting the material unloading station at the mine surface plant with the unloading station at the head of the concentrator. The reel of wire rope is suspended on an axle mounted on a timber frame so that the reel will unwind from the bottom. The straightening device consists of three grooved pulleys bolted to a heavy piece of plank and held in front of the reel by a steel axle resting between the board extension nailed to the steel frame.

HAULAGE WAYS *Jr.*

Automatic Self-Centering keeps these coupler heads in position to join on impact.



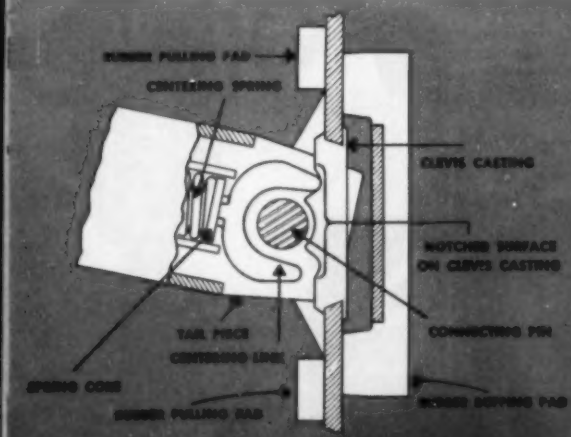
Get Speed in your Haulage with Couplers that—

STAY IN LINE!

Self-centering O-B Automatic Mine Car Couplers speed up mine car haulage. With old-fashioned couplers a man is needed to guide the heads together, and to make the connection between them. Self-centered couplers come together securely--surely--by themselves.

Parts of the self-centering mechanism are shown in the illustrations here. Rivets passing through the coupler body hold a spring compressed against a spring core. The square core end is recessed to receive a stud on the centering link which bears, at its tips, on a notched surface on the clevis casting. When the coupler tail piece is joined to the clevis by the connecting pin, the link stud presses against the core; depresses the spring. As the coupler head is moved off center, the link rocks on either tip and compresses the spring still further. Thus when the head is released, the link is forced by the spring to pivot about its tip until the head is centered again.

This is how unengaged O-B Automatic Couplers are kept in alignment with the mine car center-line at all times. Self-centering is one of several features in the O-B Automatic Coupler. We'll be glad to show you how these couplers help deliver more coal at the tipple in a given time, and put more economies into your operating method at the same time. Write for more information.



The sketch shows the connecting link pivoting about one of its tips. The centering spring and spring core press on the centering link to return it, and the coupler head, to center alignment.

Ohio Brass

MANSFIELD OHIO, U. S. A.

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

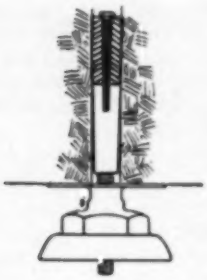
HAULAGE WAYS *Jr.*

HOW TO FASTEN HANGERS *Anywhere*—

TYPE-A-3 EXPANSION BOLTS

One of several expansion bolt styles used for fastening mine hangers and similar devices directly to the roof. The Type-A-3 is made in four-inch and six-inch lengths.

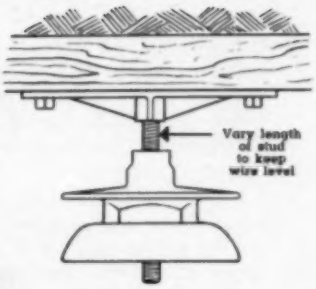
Catalog No.	*Size*
10072	4"
10073	6"

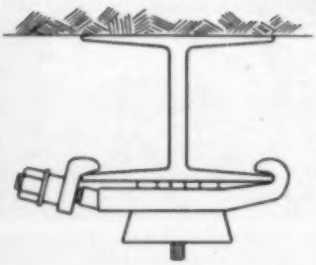


HANGER ADAPTER

Use this fitting to fasten spool insulators or similar hangers to mine timbers or to steel I-beams with the I-beam clamp.

Catalog No.	
15509	Hanger Adapter with ⅝-inch tapped boss





I-BEAM CLAMP

Timber-type hangers are attached to I-beams with this easily used clamp. Other O-B hanger adapters are available for the attachment of a number of roof and universal-type O-B hangers to I-beams.

Catalog No.	*Flange Size*
11238	3 to 4½ inches
10080	4 to 5½ inches
14080	5 to 6½ inches

Here are a number of good ways to fasten hangers in your mine with standard O-B fittings. One or more of the methods shown ought to be appropriate in any tough hanger-fastening situation which you may have, and there are even more shown in the O-B Mining Catalog. There's an O-B method for fastening hangers to timbers, I-beams, pipes, roof bolts, to the roof or even to span wires.

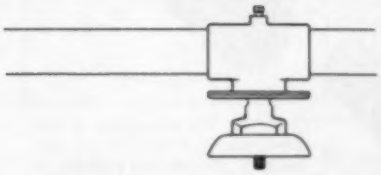
Each of the fittings made by O-B for use in the support of hangers is suitably protected from corrosion. Flecto malleable iron with hot-dip galvanizing is used to assure long life for the fittings.

Use of the fittings is not restricted to fastening hangers--this multi-purpose hardware does a number of jobs throughout the mine. Select a few to keep in stock, and simplify your storekeeping as well as your trolley installations!

HORIZONTAL PIPE ADAPTER

One set screw holds the adapter securely on the pipe. A ⅝-inch threaded stud permits the attachment of any one of several O-B hangers.

Catalog No.	*Pipe Size*
14356	1¼ inch
12011	1½ inch
18902	2 inches



ROOF SUPPORT EXPANSION SHELLS AND PLUGS

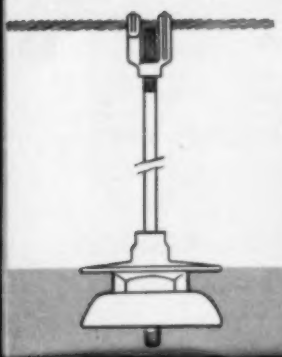
These extremely popular shell and plug units are used to hold ¾-inch roof bolts or threaded rods for roof support. When the threaded rods are used, the protruding rod end is available for fastening a K-3 hanger with ⅝-inch boss (Cat. No. 22015).

Catalog No.	
21869	Roof Support Expansion Shells and Plugs for ¾-inch rods

SISTER HOOK

Hangers and other fittings can be attached to span wires with this two-pronged clip. A ⅝-inch threaded rod tightens against the cable after the hooks are in place.

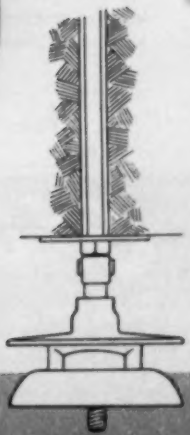
Catalog No.	
14231	⅝-inch rod; ⅓-inch maximum cable size



ADAPTER

When one-inch roof support rods are used, this adapter fastens to the protruding threaded end, allowing hangers to be fastened to the rod.

Catalog No.	
22155	Adapter for one-inch rod



Ohio Brass

MANSFIELD OHIO, U. S. A.

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

HAULAGE WAYS *Jr.*

SUIT THE BOND TO THE JOB

This AW-9 Rail Bond is applied to the rail head by steel arc-welding. The terminal design reduces possibility of injury from car wheels.

The AW-20 is a typical long bond used to span joint plates. It is one of four O-B bonds for the purpose installed by the steel arc-weld process. Other joint plate bonds offered by O-B are mechanically applied or arc welded with copper alloy.

O-B Bonds are available for any haulage requirement

Durable, dependable O-B Rail Bonds are available for ANY mine rail bonding requirement. There are bonds for attachment to the rail base or to the head of the rail; others are used to join opposite rails of the track in cross-bonding, or for special work around switches.

Certain O-B bonds are designed for installation by arc welding or gas welding. Others are installed mechanically. With your choice of attachment method--with a wide selection for any bonding purpose, you have a complete line of tested, proved rail bonds for your haulage system.

Let O-B help suit the bond to the purpose. Our representatives are glad to talk with you about your bonding problems. Ask them for suggestions, or write to us for answers to your specific bonding needs.

Under the rail base these AW-19 bonds are out of the way and well protected. AW-19's are installed by arc welding with steel rod: AW-18's for the same application are arc welded with copper.

For use in cross bonding, the Wedge-Type Bond is easy to handle and install. The terminal is mechanically applied. Other cross bonds are attached by copper alloy or steel arc welding.

4090 M

Ohio Brass

MANSFIELD OHIO, U. S. A.

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

Truck Does Varied Jobs Around Strip Mine

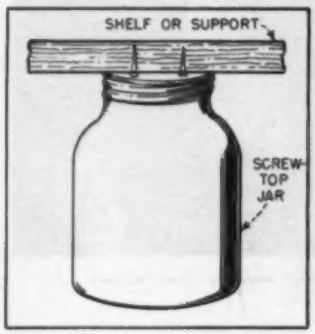
A TRUCK SPECIALLY EQUIPPED with a power winch and an A-frame and built primarily for hoisting pit pumps and moving them serves other useful purposes as well at the strip mine of The Enos Coal Mining Co., Oakland City, Ind.

The winch is driven by a power take-off from the Ford truck engine. The legs of the A-frame are telescopic and can be extended or shortened as needed by inserting pins in holes bored through the steel tubing. To handle a pump, the truck is backed into position, the wire-rope sling is fastened to the pump and the pump is hoisted. Suspended from the A-frame behind the truck bed, it is carried to its destination and lowered into place.

Besides hauling pumps around the pit, the truck has been used for pulling stuck vehicles out of the mud, setting power-line poles and hauling cable and hose. It carries a drum filled with gasoline for refueling pumps and tractors, as shown in the accompanying photograph.

The Enos Coal Mining Co. owns three trucks like the one pictured, besides a fourth one with a much larger A-frame. This last one is used almost exclusively for setting power-line poles.

A Convenient Method of Storing Small Parts in Full View



A SIMPLE METHOD of keeping nails, screws, washers, bolts, cotters and other small parts in plain sight, thus saving time ordinarily wasted in looking through a number of containers, is shown in the accompanying drawing. As indicated, the screw lid of a jar is attached to the underside of a conveniently placed shelf or other support, using two small flat-head screws. If the material kept in the jar is heavy, the lid can be strengthened by placing washers between the screw heads and the jar lid.

In practice, a number of jars generally are so attached in a straight row, with enough space between them to provide ready access. Thus, any one can be quickly removed with a turning motion, and as quickly replaced.

This basic idea can be carried still further when a large number of parts is to be stored, by building a device similar in principle to a ferris wheel and attaching the jar lids to rigid wooden crossbars. By simply revolving the wheel, access is easily provided to a large number of jars kept in a relatively small space. The parts tumble against the lids of the jars at the top of the wheel, and against the bottom of the jars at the bottom, to automaically provide additional leverage-weight at the bottom of the wheel at all times.

Simplified Cable Protector

TWO LENGTHS of railroad rail welded to base plates provide simple but position protection for trailing cables at Chieftain No. 20 strip pit of the Maumee Collieries Co., Riley, Ind. As the illustration shows, the protector is laid down wherever needed and the cable placed between the rails. Undercutting the heads at both ends and twisting the protector slightly keeps the cable in place, yet permits passage of tire-mounted or crawler equipment (tractors, drills and so on) without possibility of damage to the cable.

What About Your Ideas?

AS YOU READ this section month after month, you may often recall a good operating, electrical, maintenance or safety idea you've successfully put to work at your operation. Don't keep it secret! It will take you only a minute to write COAL AGE about it, and we will gladly pay you $5 or more for each usable idea, on publication. Address: The Editor, COAL AGE, 330 W. 42d St., New York 18, N. Y.

The Foremen's Forum

THE PRIME BENEFIT of emergency-preparation is the mutual protection it offers—if every man does his part.

Among mining men, especially, this is a valid query . . .

"Am I My Brother's Keeper?"

How Six Men Answered . . .

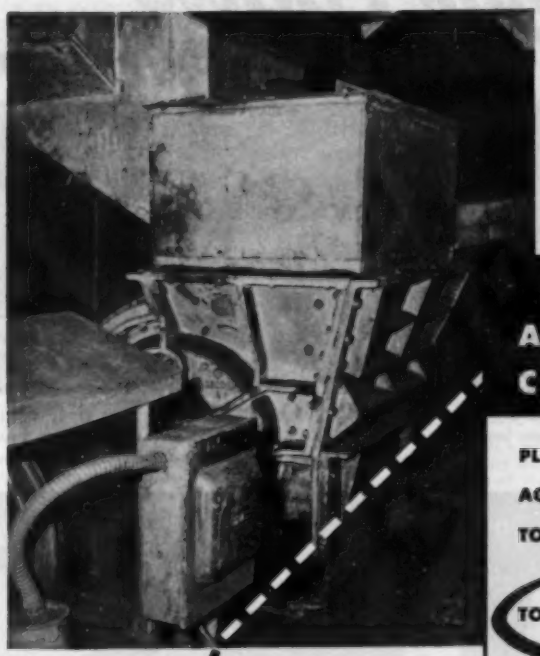
A Machineman
A Fireboss
A Laborer
A Bureau of Mines Engineer
A Shaftman
A Water-Safety Director

A Crisis Attracts the Type of Man Required To Meet It—Invariably, That Man Is Intelligent, Trained, Prepared

IN FOREMEN'S FORUM for September, 1950, the benefits of "cool-headedness" were emphasized. Some suggestions for achieving cool-headedness under stress, such as adequate knowledge, intensive training and intelligent planning, were presented. Here are some incidents, gleaned from many sources, that show how coolness paid off.

Last November three shaftmen were at their customary duties, working from a platform deep in an anthracite shaft. A squeeze near the top of the shaft caused some rock and shaft timber to plummet down upon the men on the platform. Unfortunately, two of the men were knocked from the platform and fell to the bottom of the shaft as they tried to gain the safety

These "CRUSHING" FACTS - - - - - -



Another
American Crusher
CASE HISTORY

PLACE: Illinois Coal Mine

AGE OF CRUSHER: 14 years

TOTAL TONNAGE CRUSHED: 1,472,805

TOTAL COST PER TON: one half of 1¢*

- - again prove

AMERICAN CRUSHER performance

* The total cost figure for the 14-year coal crushing operations of the Illinois coal mine, whose American Crusher record is shown above, includes: original cost of crusher (completely depreciated); plus cost of replacement parts; plus maintenance costs; plus interest on original investment (at 3% for 14 years).

But here is the really significant fact: an independent survey of users of American equipment has shown that this performance record is a typical one for Americans—a consistent pattern of high tonnage reduction at remarkably low parts-replacement cost.

Only such features as the exclusive Crushing Ring Design—originated and perfected by American — could reduce coal in power plants and coal mines across the country year after year, ton after ton, for *less than 1c per ton.*

Find out how you may reduce the cost of your own crushing problems.

Write for detailed information and illustrated literature.

American

Originators and Manufacturers of Ring Crushers and Pulverizers

1119 Macklind Ave.
St. Louis 10, Mo.

IMPROPER LUBRICATION AT *These Four Points* CAN COST YOU PLENTY!

1 BEARING LUBRICATION of automatic loaders. Cities Service Trojan Grease recommendations can help prevent breakdowns, reduce excess wear, save maintenance costs.

2 JOURNAL BOX LUBRICATION. The right grade and type of Cities Service Trojan greases will help keep your mine equipment operating smoothly, efficiently, and at less cost.

3 POWER SHOVEL LUBRICATION. Specific grades of Trojan greases recommended by Cities Service are daily prolonging life and efficiency of strip mining machinery.

4 CONVEYOR LUBRICATION. Critical conveyor lubrication problems have been satisfactorily solved in many cases by the use of Cities Service lubricants.

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FREE! Send for this helpful new booklet ▶

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- Optimus Cylinder Oils
- Trojan Gear Oils

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Please send me without obligation your new booklet entitled "Coal Mining Machinery Lubrication."

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QUALITY PETROLEUM PRODUCTS

How Cool-Headed Preparedness Paid Off in Six Mine Emergencies

of the cage in the other compartment.

The other man, warned by the rumbling, successfully leaped to the cage, where he was protected from the falling material. However, the cage was out of the guides and could not be raised or lowered.

Walter Legins, another shaftman, accepted the challenge and was lowered by rope and harness about 600 ft through the ominous silence to the bound cage. For the next 4 hr Mr. Legins and the stranded man worked at freeing the cage of debris and getting it back on the guides.

Mr. Legins' coolness and selfless courage saved a life that night.

The scene shifts. Last February at another colliery Michael Dobson, fireboss, was making his regular round of breasts and airways in a pitching vein. He saw the beams of two cap lamps in the darkness ahead of him, but there was no visible motion of the lamps. He approached the place with his safety lamp and found two men almost buried under coal and unconscious, as the result of a gas outburst. He carried one down the gangway to safety and revived him. Repeated attempts to rescue the other failed, but not because the spirit wasn't willing. Mr. Dobson tried to the limit of his own physical ability.

Courage and coolness among mining men is not a regional virtue. The following spread-eagle the nation.

In the summer of 1943 a cloudburst placed a heavy burden on the storm sewers in a certain section of western Pennsylvania. The high pressure of the water ruptured a retaining wall that had been built to protect a nearby mine from flooding. The water rushed down the slope, flooded the mine and trapped six nightshift workmen. An immediate call for pumping equipment, issued by the rescue force, was answered and dewatering was begun.

Two days later the water level had been lowered to provide a space of a few inches between the surface of the water and the roof. E. E. Quenon, U. S. Bureau of Mines, waded and swam back into the mine and ascertained that the trapped men were still alive. John Komp, water safety director of the Pittsburgh Red Cross, then made five trips to the weakened men with a surfboard loaded with food and stimulants.

The water level dropped with agonizing slowness, and as tension mounted among relatives of the trapped men it was decided to make a rescue attempt. Thereupon Mr. Komp made six more trips with the surfboard bringing out one of the men each time. Quenon and Komp thereby added another chapter to the warm history of courageous mine rescues.

In Kentucky, Ellis Bowman, a machineman, was a passenger with 22 other men on a man-trip pulled by a locomotive one day in May, 1949. The trip was going in and as it started down grade the motorman was thrown off and seriously injured. The trip gathered speed on the grade and the 23 men appeared to be headed for serious injury or worse.

Now Mr. Bowman took over. He crawled from the third car of the trip over the tops of the first two cars and into the cab of the locomotive, where he succeeded in controlling the trip. The value of Mr. Bowman's actions became more apparent when the trip reached the foot of the slope—the "flatroader" was standing there with a trip of loads.

A young Utah mineworker, Jerome Hernandez, exposed himself to great personal risk to rescue a fellow-worker from a bad situation. The man, a loading-machine operator, was working a faulted area when the roof collapsed, pinning him against the machine with serious injuries. Despite the fact that the roof was still working, Mr. Hernandez entered the place and freed the injured operator. He helped carry him to a safe place and administered first aid.

A scant few weeks ago a miner was trapped for 54 hr in a mine in the state of Washington. Details of the rescue available to us are spotty, but it can be assumed with certainty that the rescuers worked under hazardous conditions. It also can be assumed such conditions did not interfere with their mission of befriending a man when he most needed friends.

From time to time the press carries stories of other mine rescues, both here and abroad. Cool-headed, trained men in many mining districts stand by as life insurance in the literal meaning of the term. At least, it is evident from the incidents described here that such men are on guard from Vandling, Pa., to Roslyn, Wash.

The attributes are not regional, as noted previously, nor are they confined to men in one job classification. In the foregoing a shaftman, machineman, fireboss, laborer, Bureau of Mines engineer and Red Cross water-safety director are represented.

Nor is this coolness acquired over any definite period of experience. Mr. Bowman possessed a record of 38 yr service at the time of his heroic deed, but Mr. Hernandez, 25 yr old when he saved the loading-machine operator, had nowhere near that amount of experience.

Further, these situations are not confined to any single aspect of mining. Note that the accidents run the full gamut: roof fall, haulage, ventilation, water and shaft maintenance.

In praising these rescuers, we understand that many other incidents are equally dramatic, publicized or not, and if someone at your mine has made coolness pay in a crisis we know the light cast here will reflect to your cool-headed friend at peak intensity. However, praise is not the only purpose of this piece. An equally important purpose is to clinch the validity of the September Foremen's Forum contention that knowledge, training and planning are vital in certain situations that arise in mining. You can see the evidence in each citation.

To the question, "Am I my Brother's keeper?" stands the answer: "Yes, I am." We must be smart, trained and prepared to produce on demand.

"Same Old Stuff" or Valuable Lesson?

FOR YEARS we have maintained that it is a mistake to disregard old safety slogans, safety methods, and safety ideas because of their age, particularly when the preservation of some fundamental principle of safety is involved. This attitude has frequently been vigorously assailed; hence it is with no little satisfaction that we find confirmation of our argument for retaining the best of the old things and adopting the best of the new.

Recently a speaker had this to say: "Repetition soon gets tiresome, but you can't avoid it in any educational process. Those whose job is influencing people soon discover that the number of basic appeals is limited, and it takes all their ingenuity to present them in a new garb. 'Same old stuff' is just about the most uncomplimentary thing you can say.

"Lots of people look with contempt on anything they've heard before. Teachers, foremen, safety men, and many others get bored repeating familiar truth. Often they quit too soon.

"'Same old stuff' bobs up in advertising and selling, too. These fields, which are expected to produce immense crops of new ideas continually use all the old stuff and gain by it.

"In any safety speech or article you'll find a lot of familiar facts and arguments. Just think of the many safety speeches you have heard in the past, and you will be surprised to find how much of those constructive talks applies today. Actually, there is nothing new that can be said about good housekeeping, about plant maintenance, and about countless other details of an effective plant safety program, but we have to keep hammering away at them.

"A good composer can pick a lot of tunes out of one octave, and it's surprising how many ways you can tell the same story with a vocabulary of less than a thousand words."

—*Youngstown Sheet & Tube Bulletin*

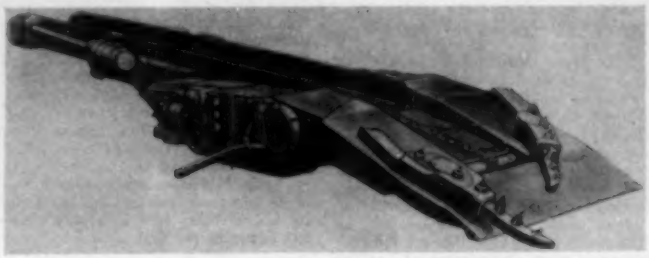
New Units Built for High Capacity in Very Low Coal (1)

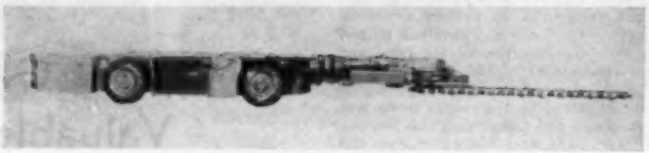
New Joy line of high-capacity equipment designed for trackless mining in very low coal includes the 20-BU-1 loader, 24 in high, and the 8-SC shuttle car and 12-RB mobile cutter, both 26 in high. A hydraulic roof-bolting drill with an overall height of 26 in also is available.

Despite its low height, the new Joy 20-BU-1 loader is said by the manufacturer to have a capacity of 8 tons per minute. Gathering arms and conveyor are separately driven to permit continued loading in case of shuttle-car delay, and the conveyor can continue to load into the shuttle car if the gathering arms should jam in the face. The unit is crawler-mounted and is equipped with a swinging conveyor to facilitate loading.

The 8-SC shuttle car has a water-level capacity of 80 cu ft. A centrally located operator's platform provides equal visibility in either direction and a new tapered-end design is said to permit minimum turning clearance. Other features of the 8-SC cited by the maker include: 4-wheel airplane-type brakes; hydraulically boosted steering; hydraulic-adjustable elevating discharge; hydraulically driven cable reel; 4-wheel drive and steer.

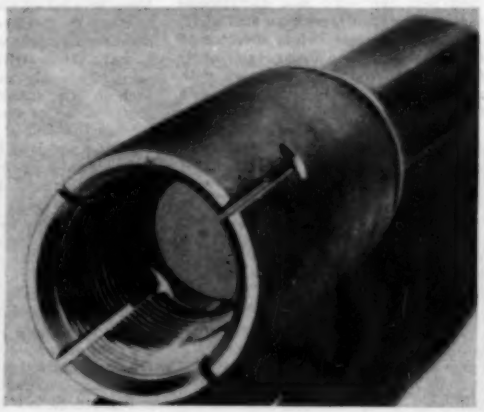
The 12-RB is a rubber-tired-mounted mobile cutting machine which can be supplied either as a bottom- or top-cutter both driven and steered hydraulically. For slabbing, the cutter bar can be swung 90 deg to either side and the cutter-chain drive is powered by a 50-hp motor. Hydraulic bar-tilt and lift and limited boom-roll offer compensation for normal irregularities in mine roof or bottom.—*Joy Mfg. Co., Pittsburgh 22, Pa.*





Tool Recovers Bits and Broken Steel (2)

New Rock Bit "Hole Saver" may be used to reclaim lost bits and drill steel broken off in the hole and thus save redrilling the hole, the manufacturer reports. In operation, the tool is attached to a threaded steel in place of a bit and its special left-hand tapered threads cut into the metal of the broken rod and remove it quickly and easily, without jamming, it is said. The tool is threaded for Timken H or D, Rock Bit R-1 or R-2 steel, to fit the following size steels: (a) ⅞-in hex. and Q.O.; 1-in hex. and Q.O.; 1⅜-in Rd.; (b) 1¼ and 1⅛-in Rd.—*Rock bit Sales & Service Co., Philadelphia 25.*



Looking for an Idea?

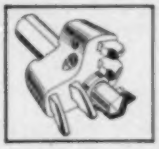
ANY ONE OF THE 48 NEW PRODUCTS or catalogs described in this section might repay you many times over for the time you spend checking these pages. Manufacturers are glad to send you information—without obligation—so why not make use of the postage-free card facing p 1367

From Forge to Lamps

Operators of the Fork Mountain Coal Co., Fork Mountain, Tenn., report that since Kennametal U-4 Bits have been in service, the job of sharpening and hard-tipping bits has been eliminated. The blacksmith now has an easier job —taking care of lamps. The superintendent, Tom Jones, sharpens the bits in his spare time.

●

Powerful New Bit For Drilling Hard Rock



A new bit that Kennametal has recently developed drills the hardest rock that most strip miners will encounter. It has a solid alloy steel body, is set with regular Kennametal Mining Machine Bits. The bit is for heavy impact service — drills ground interspersed with boulders, laminated sandstone, limestone, hard shale, and hard slate.

Write for Bulletin M-135.

●

New Catalog Available

Kennametal recently issued a new catalog. It illustrates and describes twelve new tools as well as the regular line. The catalog contains the latest and most complete information available on carbide cutting and drilling tools for the mining industry.

Write for Catalog M-6.

●

Bit to Put Bolt Holes In Hard Roof

New FD bit with Kennametal cemented carbide cutting edge permits use of coal drills to drill bolt holes in hard roof. Bit gives steady drilling in laminated sandstone, slate, and other hard materials.

Our representatives will be glad to work with you and give you suggestions on how to mount your drill.

Write for Bulletin M-105. Kennametal Inc., Latrobe, Pa.

ADVERTISEMENT

Kennametal U-4 Bits

Boost Production 22% at Fork Mountain Coal Co.

U-4's (on 3588 Machines) cut 250 places or 30,000 tons of coal in the Regal Seam—reduce bit cost to .41 of one cent per ton.

Tom Jones, who is superintendent of the Regal Mine, Fork Mountain Coal Co., Fork Mountain, Tennessee, says that without any other change in mining equipment, he has made an increase of 22% in coal production by using Kennametal U-4 Bits.

A boney streak 2" to 6" thick in the cut causes a serious cutting problem. Hard-tipped bits had been used, but this proved to be a costly solution, as welding equipment, acetylene, oxygen, hard-tipping material and labor were costly and bit changes even with hard-tipped bits were necessary every place.

U-4 Bits have averaged a full shift or more of service between changes and they increased the number of places cut per machine shift from 7 places to 9 places or approximately 35 tons per machine shift. Bit cost has been reduced to .41 of one cent per ton and other savings have been made on material, labor, and machine repair.

While conditions are different from mine to mine, the cost savings made by Kennametal Bits is surprisingly consistent. You will not get the same results as were obtained at the Regal Mine—they could be even better. Won't you get in touch with a Kennametal representative today and find out how you can save—through an actual DEMONSTRATION. Our representative will be glad to make it, at no cost or obligation.

Write Kennametal Inc., Latrobe, Pa.

KENNAMETAL®

DRILL BITS • MACHINE BITS • STRIP BITS • ROCK BITS

Specialist in Coal Cutting and Coal Drilling with Cemented Carbide Tools

New Loader Designed for Use With Large Shuttle Cars in Higher Seams (3)

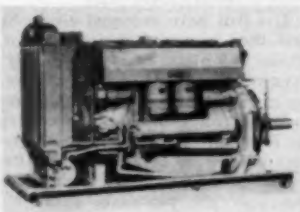
The latest addition to the Goodman line of loaders for trackless mining, the Type 665, is primarily intended for operation in higher coal seams and with a loading rate of 8 to 10 tons per minute is well suited for use with large shuttle cars, the maker points out. Overall height is 43 in. The unit has a roadway clearance of 8½ in, which permits its use where the bottom is soft or heavy. Straight-ahead loading may be readily accomplished with only forward and backward movement of the machine, it is said, and both the loading head and discharge end swing up to 40 deg to either side of center. The operator stands well back from the face and has an unobstructed view of all movements, while complete hydraulic controls facilitate operator control and loader operation. Bulletin CLT-501 offers full details on the Type 665 loader.—*Goodman Mfg. Co., Chicago* 9.

Motor Starters Offer Dual Protection (4)

Protection of operating personnel as well as the connected machine is stressed in the new Westinghouse "Motor Watchman" Class 10-100-S1 motor starter. With ratings up to 600 v, 7½ hp polyphase, 5 hp single phase; or 220 v 1½ hp dc, the unit starts, stops and provides overload protection for single-phase, polyphase and dc motors. The self-indicating handle, interlocked cover that prevent opening unless the starter is "off," and a safety latch for locking the starter "off" during servicing are among the features cited by the maker. Positive motor protection is provided by the quick-make quick-break over-center toggle mechanism—De-ion arc-quenching—and the bi-metallic disk-type thermal-overload relay. Straight-through wiring is designed to facilitate installation and servicing and Bonderized enclosures prevent blistering, flaking and corroding.—*Westinghouse Electric Corp., Pittsburgh* 30, *Pa.*

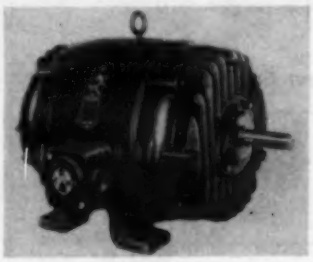
New Features Boost Transformer Life (5)

To provide true sealed-tank construction for its Form W transformers, Wagner Electric has developed an entirely new "Shur-Seal" method of fastening the cover to the tank that forms a positive seal and prevents "breathing" as well as oil leakage during shipping or handling. The units also are now being filled with a new inhibited transformer oil which reduces oxidation to a minimum, thus retarding the formation of acids and sludge that ultimately cause oil deterioration, the company reports. Use of the Shur-Seal and inhibited oil greatly prolong the service life of the Form W transformers, which feature small size, light weight and excellent electrical performance, it is said.—*Wagner Electric Corp., St. Louis* 14, *Mo.*



Diesel Line Has Higher Operating Speeds (6)

A new line of heavy-duty Murphy diesel engines recently announced consists of six models from 145 to 220 hp designed to operate at continuous speeds up to 1,400 rpm. The higher operating speeds will permit their application to many new services, including those requiring torque-converter power transmission, the company reports. The new line offers various Murphy design features, such as "true" diesel operation, unit-fuel injection, four valves per cylinder, hydraulic servo-type governor, etc. Specification sheets and other details are available.—*Murphy Diesel Co., Milwaukee* 14, *Wis.*



Totally Enclosed Motor Line Extended (7)

Extension of its line of Type QZE totally enclosed non-ventilated squirrel-cage induction motors to include continuous ratings built in NEMA Standard Frame 284 has been announced by Fairbanks, Morse & Co. At present, the units are available in 7½-hp 1-800-rpm and 5-hp 1,200-rpm. models and are said to be particularly suited for service where dust, dirt, sand, etc., are prevalent since there are no ventilating openings to clog. Features cited by the manufacturer include the F-M "Copperspun" rotor; cartridge-type ball bearings which may be sealed for life if desired but also are designed for easy flushing and regreasing; and the exclusive F-M dual-type conduit boxes, of special value where space is limited. For Bulletin 1215 giving full details, circle 7 on the postage-free card.—*Fairbanks, Morse & Co., Chicago* 5.

Photograph by Barton Murray

Take a look at tomorrow's highway

There's a great new era ahead in highway construction. You can see it in the famous Pennsylvania Turnpike, now being extended eastward to the outskirts of Philadelphia, westward to the Ohio border.

This modern "thru-way", a pioneer triumph of engineering for transportation safety, speed, comfort and convenience, stretches for *260* miles without a single stop light, crossing, sharp turn or noticeable grade. It is the nucleus of a vast super-highway transportation system that one day may link every section of the country.

Cyanamid blasting materials and the cooperation of Cyanamid explosives engineers have helped to telescope the work of years into months in moving "mountains" of earth and rock to make way for this huge project. Supplying explosives and assistance in their use for mining, quarrying and other purposes, as well as construction, is another of many Cyanamid services that are helping America build for the future.

AMERICAN *Cyanamid* COMPANY

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Materials for the explosives-using industries—Another of the services performed by Cyanamid

it's New! it's Different!

it's the strongest pipe wrench in the world!

–the revolutionary Walworth improved Walco®

Yes, this is it . . . the NEW Walworth *Improved* Walco pipe wrench–with every part scientifically designed and tested by engineers for strength, safety and ease of operation. Its instant bite, and accurately determined center of gravity, combine with its inherent strength and minimum of weight to make it the fastest-working, easiest-handling, best balanced, heavy-duty pipe wrench available today . . . a wrench specially designed to minimize operator fatigue.

All parts are made of forged steel. The housing and handle are projection welded–a structural weld–to form an integral unit. Both jaws are carefully machined, and all parts are heat-treated to give extra toughness, uniformity, and strength. Every Improved Walco far exceeds the requirements for Federal Specification GGG-W-651a for Type II Heavy Duty Adjustable Pipe Wrenches.

A flexible, double-acting, easily replaceable spring–an exclusive patented Improved Walco feature–gives the wrench fast, positive ratcheting action!

Ask your Walworth distributor about the new, Improved Walco today! Heft the new, Improved Walco . . . feel its perfect balance–every part is guaranteed by the Walworth Company, doing business since 1842.

Check these outstanding features

LIGHTER: Housing and Handle are projection welded to form one integral unit.

CORRECT BALANCE: Accurate, the correct location of the center of gravity determined by test.

STRONGER: Heat treated to eliminate brittleness . . . cracking.

FAST ACTING: Scientifically designed spring action insures positive ratcheting action . . . quick bite.

CALIBRATED PIPE SCALE: Built-in scale permits speedy adjustment to pipe size.

RENEWABLE PARTS: All parts are readily obtainable, and easily replaced without special tools; thus prolonging service life indefinitely.

RUST RESISTANT FINISH: Entire wrench is rust resistant — Nut and Jaws have a special electroplated zinc coating.

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The trucks that do the most for you!

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NEW Extra Quiet Brakes! Another Dodge "first"! Molded, tapered Cyclebond brake lining. Practically eliminates squeal and grab. Extra-smooth, positive action. Extra-long life. Standard on trucks 1½-ton and up, except air brake models.

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- NEW! EASIER BAD-WEATHER STARTING
- NEW! GREATER ELECTRICAL CAPACITY
- NEW! EASIER-TO-READ INSTRUMENTS
- NEW! BETTER VISIBILITY IN BAD WEATHER
- NEW! MORE EFFICIENT FUEL PUMP

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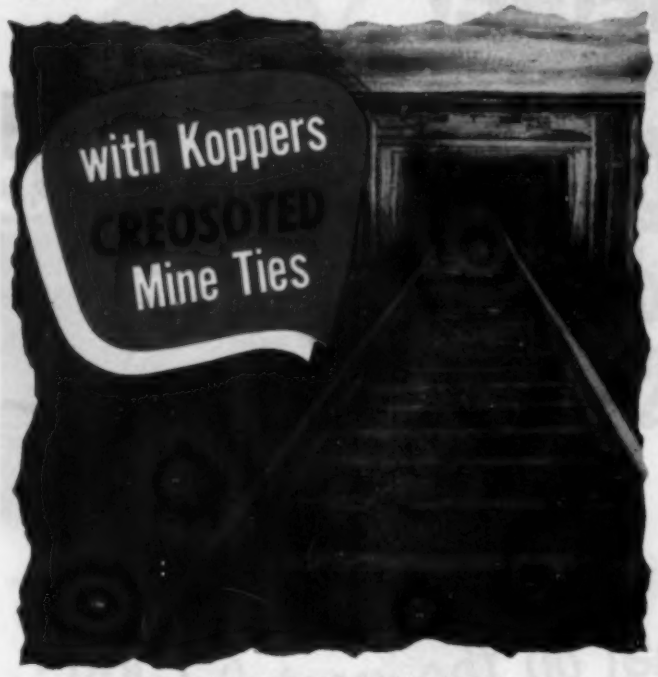

Pressure-Creosoted Oak Ties Used in a Coal Mine's Main Haulageway.

● With today's high-speed, heavy-tonnage haulage, there's no place for *bad* ties. They represent a serious hazard. And frequent replacements run into too much money.

Koppers Pressure-Creosoted Timber Ties are protected against decay. They *retain* their strength. Because of their exceptionally long life, they effect substantial savings.

For example, 3,809 sawed southern pine ties, each impregnated with creosote, were installed in a location where *untreated* ties had lasted, on the average, only 4 years. It was estimated that the *treated* ties would last 20 years; on this theoretical basis, the cost per year would be cut by more than 62%, and the net savings for the installation would be about $12,000.

After 21 years' hard service, this haulageway was inspected, and its performance reviewed. *The anticipated savings had been fully realized!* Moreover, more than 97% of the ties were still serviceable; therefore, the eventual savings will be even greater.

In many other places, Koppers Pressure-Treated Wood can save money for mine operators. For full information, send for our free book, "10 Proven Ways to Cut Mining Costs." Mail in the handy coupon, and this helpful book will be on its way to you.

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Pittsburgh 19, Pa.

Please send me a free copy of *"10 Proven Ways to Cut Mining Costs."*

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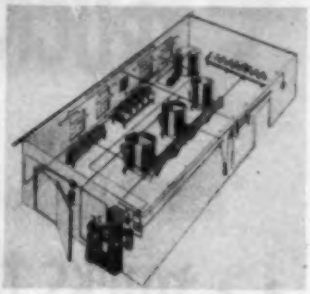
Electric Chain Hoists (8)

A new line of "Bob-Cat" heavy-duty electric cable hoists announced by the Cleveland Chain & Mfg. Co. includes ½-, 1-, 1½-, 2-, 3- and 5-ton units. The motor is totally enclosed within the cable drum to greatly reduce the overall dimensions, permit substantial weight savings and offer complete protection against outside contaminants, the maker reports. The hoists are powered by special high-torque Ohio motors and all load-lifting and carrying parts are made of steel forgings and castings, with a safety factor in excess of 6:1, it is said. Designed for operation on 220, 280, 440 or 550 v, 3-phase, 60 cycles, Bob-Cat hoists are available with either pendant-rope control of push-button control on pendant cable.—*Cleveland Chain & Mfg. Co., Cleveland 5.*



Piped System Guards Fire Hazards (9)

A new dry-chemical piped system developed for automatic protection of fire hazards by the Ansul Chemical Co. is said to be the first using dry chemical as the extinguishing agent. Available for the protection of either large areas or single equipment units as desired, the system automatically operates when a fire starts and temperature increases to discharge through strategically located distribution heads. Automatic controls can be added to close doors, windows, ventilation ducts, etc., and electrical controls can be included to shut off motors and fans, sound alarms and transmit signals. Manual operation also is possible. Bulletin available.—*Ansul Chemical Co., Marinette, Wis.*

48 NEW PRODUCTS . . . OR CATALOGS are described in this section. Have you checked through them—or are you missing a good bet that may help you jack output and cut operating costs? The handy postcard facing p 136 will bring you more dope on any of them—without obligation.

back up your shovels with

TOUGH, MOLD-CURED HAZACORD

IT'S A TOUGH LIFE that electric shovel cable has to face. That's why Hazacord Shovel Cable is specially designed and constructed with the extra strength and durability that pays off in this severe service. Take Hazacord's outside protection—the Hazaprene ZBF Sheath. It's a double-layer, reinforced sheath that's mold cured under pressure to form a dense, homogeneous wall with tire-tread toughness and resiliency. Compounded with neoprene, it's unaffected by oil, acids, water, and sunlight. Yet with all the life-extending toughness you get with Hazacord Shovel Cable, ample flexibility for easy handling is retained.

TO KEEP SHOVELS WORKING Hazacord is designed-for-the-job with many "inside" features as well that give you *extra protection* against cable failure. Long-lived, electrically stable, heat-resisting Performite insulates each conductor; permanently colored Okobestoprene Tape (a non-fibrous asbestos-neoprene material developed by Okonite) is precision wrapped around each insulated conductor. It seals into a flame- and moisture-resistant, non-rotting protective covering that also provides flexibility and permanent circuit identification. For moisture tightness at cable ends, and added cushioning qualities, Hazaprene fillers are used in conductor interstices instead of ordinary fibrous material.

HAZARD ...bles for every mining use

Equipment Shorts You'll Want to Check

(10) GOGGLES AND GLASSES CLEANING is simpler and less costly with its new silicone-treated "Magic-Lens Tissue" the maker says. The larger-sized tissues use GE silicone, which is left on the glasses as an invisible film to provide a clearer, longer-lasting cleaning. They are interfolded and packed in sealed cartridges for use in a low-cost easily filled dispenser. Folder available.—*Silicone Paper Co. of America, Inc., New York* 17.

(11) MANY ENGINE BREAKDOWNS and lost time for overheating troubles in liquid-cooled gasoline or diesel internal-combustion engines can be completely eliminated with its new Perry electro-chemically-activated cooling-system filter that insures a clean cooling system and prevents scale deposits, the maker says. The unit is available in three sizes and features an easily changed filter.—*Spark-O-Liner Corp., Minneapolis, Minn.*

(12) A NEW TYPE OF SIDING said by the maker to re-surface, beautify and insulate any type of wood, clapwood, masonry or shingle structure is known as "Re-Nu-It." A waterproof substance containing asbestos and mica, Re-Nu-It is air-blasted onto the surface about 1/16-in thick to become an actual part of the existing structure. It is available in seven colors and costs no more than conventional siding, the company reports.—*RE-NU-IT Corp., New York* 18.

(13) TO TRANSFER LUBRICANTS and other liquids without spillage or waste, the new Model 82230 Speed-Flo air-operated transfer pump handles 22 gpm, fits all 2-in drums and weighs only 18 lb, the maker says. It is

equipped with a precision-flow regulator that permits finger-tip regulation of volume output. Bulletin 213 available.—*Lincoln Engineering Co., St. Louis* 20, *Mo.*

(14) FOR ATHLETE'S FOOT TREATMENT, new Sani-Mist solution is sprayed on as a fine vapor by a new treadle dispenser. Requiring only 3 sec, each application is fresh and undiluted and thus eliminates the possibility of re-infection, the maker says. A gallon of Sani-Mist reportedly provides 3,100 treatments.—*Waverly Petroleum Products Co., Philadelphia* 3.

(15) LARGE-CAPACITY GRAVITY-FEED OILERS, now available in 10-oz, 1-pt, 1- or 2½-qt-capacity Pyrex or Lucite plastic reservoirs, are designed to feed any predetermined number of drops per minute and are easily regulated by a simple needle-valve control. The maker recommends the units for use on large stationary bearings, machinery, journals, conveyor-drive chains and other applications where a large quantity of oil is required or it is desirable to extend

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ONLY CARLON . . . the first real pipe that is plastic!

ONLY CARLON PLASTIC PIPE combines the features of light weight, absolute corrosion resistance, and durability with ease of installation to solve mine piping problems.

CARLON eliminates the need for costly maintenance and replacement programs in underground and surface mining operations because it is unaffected by sulphurous waters, alkalis, and metallic salts. **Guaranteed** against rot, rust, and electrolytic corrosion, durable CARLON is proving to be superior to other types of mine pipe for a wide range of applications. In addition, it has a projected trouble-free service life many times longer than ordinary pipe. Both flexible and rigid types of CARLON are available to meet individual requirements. Flexible pipe is furnished in long lengths which require fewer fittings per installation than any other pipe. Rigid CARLON is shipped in 20-foot sections that are joined quickly with either cemented or threaded connections.

CARLON plastic pipe does not require materials handling equipment or special tools for installation.

Specify ONLY CARLON—*the pipe with the stripe*—to be sure of getting the finest mine pipe available today.

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Mine

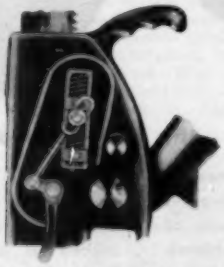
JACKS

No. 514-MT for THIN SEAMS

No. 516-MT for MEDIUM SEAMS

No. 521-MT for THICK SEAMS

The three Duff-Norton Jacks illustrated simplify selection of jacks for thin, medium and thick seam mines. All are of five ton capacity . . . the 514-MT is 14" high with a 7½"lift . . . the 516-MT is 16" high with a 9½" lift . . . and the 521-MT is 21" high with a 14½" lift. These jacks perform every lifting and lowering job with ease. For quotation, specify jacks by number.



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This world-famous patented spring mechanism is an adjustable, self-contained unit, that assures positive pawl action. Jacks cannot be tripped under load, safeguarding men and equipment.

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MAIN PLANT and GENERAL OFFICES, PITTSBURGH 30, PA. — CANADIAN PLANT, TORONTO 6, ONT.

"The House that Jacks Built"

refilling time. Bulletin available.—*Trico Fuse Mfg. Co., Milwaukee* 12, *Wis.*

(16) SAFETY GOGGLES — Two new completely revised and improved AO safety goggles, the 7000 and 3081 Series, are said by the maker to provide maximum protection with sturdy construction, rigid saddle bridge and reinforcing bar for extra strength. On both models, lens are replaceable without removing the side shield and several types of lens are available. The 3081 Series includes a soft leather guard for wearer protection.—*American Optical Co., Southbridge, Mass.*

(17) NEW LINE OF VALVES for actuating air or hydraulic cylinders features a rotating disk and are made for three types of operations—hand, foot, and finger or solenoid. They are available in 14 different models for five different cycles in six sizes and may be used for air, oil or water. Bulletin 510 offers full details.—*Ledeen Mfg. Co., Los Angeles* 15.

(18) MIDGET STORAGE BATTERY —The newest addition to the Yardney Silvercel line, Model 5HR, is 3 in high, weighs 4.30 oz and is 4.5 cu in in volume. It can be discharged at 5 amp up to 60 min, with possible rates up to 20 amp, and is suited for portable instruments and other applications where power packed in a small space is an important factor, the manufacturer says. Bulletin available.—*Yardney Electric Corp., New York* 7.

(19) VIBRATORS—New Spo Series 79 air vibrators are available in eight standard sizes for use on hoppers, chutes, etc., and can be furnished with a long-stroke or standard-stroke piston to assure correct intensity of blow. Operating on 80 psi, the units can be used on hoppers in conjunction with a Spo quick-acting hopper-gate valve, which actuates the vibrator only when the hopper discharge gate is open. Catalog 50 available.—*Spo, Inc., Cleveland* 25.

(20) CORROSION-PROOF MATERIALS AND ADVISORY SERVICE in selecting the proper material for

Planning on new wiring?

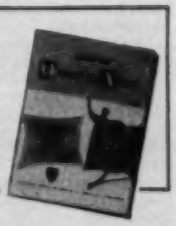
Figure it in aluminum and you'll figure low

There are two metals commonly used in electrical cable. One of them—aluminum—costs a great deal less than the other. This is true particularly for the larger sizes used for feeder lines.

Don't let "habit" rob you of the saving aluminum electrical cable can give you. Investigate aluminum for entrance cable, borehole cable, power cable and feeders. ALUMINUM COMPANY OF AMERICA, 1779B Gulf Bldg., Pittsburgh 19, Pa.

Although the rearmament program prevents unrestricted sale of aluminum and copper, we are ready to help you with the planning required for mine projects involving electrical wiring.

Get the facts! Write for "Questions and Answers About Aluminum Conductors and Installations."



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a specific corrosion problem—either plastics or alloyed metals—are reportedly available on request. The free services of its corrosion engineers in handling special requirements and conditions are offered by *National Molded Piping Distributors, Jersey City 4, N. J.*

(21) PUSH BUTTON for motor starters and lighting circuits in Class I Group D hazardous locations is equipped for conduit entrance on either top or bottom. The Type EO push button may be used as air-break or with its contacts oil-immersed, the maker says, and its construction permits conduit entrance from below without angular fittings. Bulletin 1106-C gives information.—*Electric Controller & Mfg. Co., Cleveland 4.*

(22) NEW IMPROVED Bete flat-spray or fan nozzles are said to offer more uniform coverage with less waste of spray and less overlapping of spray in multiple installations. Side jets or "horns" containing coarse droplets have been eliminated and the spray pattern made heavier in the center than at the edges. The Bete F Series nozzles include 13 stainless-steel interchangeable disks with flow rates from 1/10 to 10 gpm and spray angles of 50 to 90 deg.—*Bete Fog Nozzle, Inc., Greenfield, Mass.*

(23) VIBRATOR designed for use on bins, hoppers, chutes, shakeouts, etc. (new Style EM "Quiet-Type") employs heavier pistons, longer strokes and more positive vibration than are possible on heavy-duty impact-type vibrators without breakage, the maker reports. With no piston impact there is no ear-splitting noise, and breakage of bolts and end plates is practically eliminated, it is stated. The units come in 1¾- to 4-in sizes and are interchangeable with any bolted-type vibrator. Data sheet available.—*Cleveland Vibrator Co., Cleveland 14.*

(24) UTILITY DRILL—Lightweight pneumatic drill, Model S17, consists of drill, 14-in drill steel, three rock bits, star-drill adapter and 25 ft of air hose in carrying case for drilling concrete, brick or stone in running conduit or placing anchor bolts. Stop-rotation feature converts drill to chipping hammer or pick.—*Gardner-Denver Co., Quincy, Ill.*

YES—I would like more information . . .

Please send me catalogs or further information about the items from the Equipment News Section whose numbers are circled. (Feb., 1951)

1	5	9	13	17	21	25	29	33	37	41	45
2	6	10	14	18	22	26	30	34	38	42	46
3	7	11	15	19	23	27	31	35	39	43	47
4	8	12	16	20	24	28	32	36	40	44	48

In addition, please send me data on these OTHER products advertised in this issue (give name and page number).....

.....

My Name..... Position.....

Company .....

Address .....

(Good only if mailed before Apr. 1, 1951)

USE THIS CONVENIENT CARD . . . TO GET MORE INFORMATION on products and bulletins mentioned in this Equipment News Section or for data on any product advertised in this issue. Circle item numbers, tear out and mail.

EQUIPMENT BULLETINS AVAILABLE

(25) CORE DRILLS—Bulletin 33, Acker Drill Co., Inc., Scranton, Pa., presents in condensed form the complete line of Acker diamond and shot core drills and other drilling equipment developed during the past 30 yr. Each unit is illustrated and brief descriptions of features and applications are included.

(26-28) COAL CRUSHERS—Three bulletins issued by the Pennsylvania Crusher Co., Philadelphia 7, offer complete details of the construction, operation, features and performance for three of its crushing units, as follows:

(26) Single-roll crushers for handling a wide range of tonnages, Bulletin 2001.

(27) Reversible impactors for reducing various dry, wet or frozen materials up to 10 in, in Bulletin 6016.

(28) Bulletin 3001 provides full data on the Pennsylvania Ring-Type Granulator for preparing pulverizer and stoker coals.

(29) IF CONVEYOR-BELT SELECTION or design is one of your concerns, you'll find the new Thermoid bulletin on conveyor and elevator belting helpful. It contains a discussion of the various types of Thermoid belting and suggestions for application; and provides necessary tables, charts, and formulas for the selection of the right type of belt. Circle No. 29 on the card for Bulletin 3579 from The Thermoid Co., Trenton, N. J.

(30) CHAINS AND SPROCKETS—Jeffrey Mfg. Co., Columbus 16, has issued a new Catalog A418 covering its complete line of chains and sprockets for both new and replacement service on elevating and conveying equipment and for drives. The booklet shows and describes 22 types of malleable, steel and alloy chains as well as many types designed for special requirements. Particular emphasis is given to drive chains and all necessary information to simplify selection is included.

(31) RAILROAD-CAR SHAKER—The Allis-Chalmers car shaker for unloading granular material from hopper bottom gondola cars is described in a new bulletin that covers construction and operating features, along with specifications and a cross section through the vibrating mechanism. Bulletin 07B7221A is available from Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

(32) LIGHTWEIGHT PIPE—Bulletin 507 showing typical applications of Naylor Lockseam Spiralweld pipe in mining and other fields includes data on fittings, flanges, connections and pipe specifications from 4 to 30 in in diameter; Naylor Pipe Co., Chicago 19.

(33) THE WHY AND HOW of the economical E-M "Packaged" generators (2.75 to 187 kva) is given in a

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new 16-p booklet. The units are said to be easy to install on both stationary and portable sets, delivering electric power at constant voltage without accessory switchboard equipment. Included is much helpful electrical information, plus charts, graphs, etc., to aid in the selection and application of "Packaged" generators available for various engine mountings and drives. Circle No 000 on the card for Bulletin 2100-PRD-202 from the Electric Machinery Mfg. Co., Minneapolis 13, Minn.

(34) PORTABLE POWER CABLES —40-p Catalog Section 490-PPC available from the General Cable Corp., New York 17, offers detailed data on the construction and features of the company's complete line of power cables, including full information on ratings, sizes, capacities, dimensions and weights, etc.

(35) CONVEYOR BELTS — New 28-p catalog section on its line of conveyor and elevator belts issued by the B. F. Goodrich Co., Akron, Ohio, describes various belt features, explains why construction permits increased service life with decreased maintenance, and tells the function which each part of the belt performs, with significant data on each belt in the company's line.

(36) OVER 2,000 LISTINGS in the newly revised 1951 Lefax catalog cover the Lefax pocket-size technical books prepared as condensed source materials for engineers, construction men, technical workers and students. Each book consists of approximately 160 p of easily read tables and data in pocket-size loose-leaf form for handy reference right on the job, and a wide range of subjects are covered. Catalog available from Lefax, Philadelphia 7.

(37) PROPER INSTALLATION METHODS for Armco drainage structures, culverts, sewers and conduits are discussed in detail in an illustrated 46-p pocket-sized manual available from Armco Drainage & Metal Products, Inc., Middletown, Ohio. The handling of metal drainage products, location, proper excavation and preparation of base, detailed instructions for assembly of metal pipe, recommendations for proper backfilling and installation of underdrains are among the subjects covered.

(38) STEEL SHEETING—Applications of Armco corrugated steel sheeting for trenches, cofferdams, cutoff walls, etc., are illustrated and discussed in Manual Sh-4650 issued by the Armco Drainage & Metal Products, Inc., Middletown, Ohio. The manual covers the physical properties and service features of the two types and includes driving data and other installation information.

(39) NEW MACHINISTS' VISE that grips like a conventional vise but permits faster and easier adjustment with a sliding jaw that requires no "handle spinning" is fully described in Bulletin A-601 from the Dodge Mfg. Corp., Mishawaka, Ind. The new Dodge "Slide-Set" vise is built on a new principle and combines advantages of a heavy, conventional-type vise with a patented, fast-slide action, it is said.

(40) MAINTENANCE CHECKING CHART published by United Laboratories, Inc., Cleveland 12, Ohio, lists many common building maintenance problems and recommends a solution for each. The chart lists over 100 products and processes for maintenance of floors, roofs, interior and exterior walls, waterproofing, special paints, etc.

(41) A TWO-REEL KODACHROME SOUND MOTION PICTURE which tells the story of the new Aircosmatic process for welding aluminum, stainless steel, bronzes and Monel is now available for showings before interested groups. With a showing time of 25 min, the new 16-mm film was especially designed for showing to nontechnical as well as technical groups, and is suitable for presentation before such varied groups as foremen's meetings, trade schools and colleges, sales, engineering, and technical society meetings. Available on arrangement with Air Reduction, New York 17.

(42) BALL BEARINGS—New 39th Edition of the New Departure ball-bearing catalog contains numerous added features of interest and value to users. Selection of bearing type and size for various conditions of load and speed is considerably simplified and illustrated by examples. Load-rating tables now give both radial and thrust capacities for many bearings and speeds now include those for synchronous motors. Available from New Departure Div., General Motors Corp., Bristol, Conn.

(43) VULCANIZERS, CONTROL AND TEST DEVICES—U. S. Industrial Sales Co., Inc., New York 13, has issued catalog sheets offering new government-surplus units of various kinds, including cable vulcanizers. Complete descriptions and prices are provided.

(44) TRANSFORMERS—Safety and economy of installation and maintenance are featured in Bulletin 50-FC on air-cooled distribution transformers now being distributed by the Marcus Transformer Co., Inc., Hillside 5, N. J. The bulletin illustrates and describes the 1000 KVA Type F unit substation and also covers the various types of Marcus air-cooled power-center and "packaged power" units and its line of lighting transformers.

(45) SAFETY BELTS—The complete line of M.S.A. safety belts, described and illustrated in a new 4-p Bulletin CF-26 published by Mine Safety Appliances Co., Pittsburgh 8, Pa., includes the body type, harness type, bridge and structural-steel workers, [illegible] and miscellaneous safety belts of various types.

(46) LIFTING MAGNETS — Dings Magnetic Separator Co., Milwaukee 46, Wis., has issued a 6-p Catalog B-1401-A describing its new lightweight all-welded lifting magnets. Covered are typical applications, features and design, sizes, capacities and dimensions.

(47) LOCKNUTS—Booklet, "Types of Locknuts and Their Principles of Operation," published by the Locknut Section, Industrial Fasteners Institute, Cleveland, Ohio, discusses the design and use of locknuts and describes and illustrates the various makes available and their operating features.

(48) UNIVERSAL JOINTS — 1951 Catalog C1 from the Curtis Universal Joint Co., Inc., Springfield 7, Mass., covers its complete line, with data on how to select universal joints assembly instructions, specifications, buying instructions and prices.

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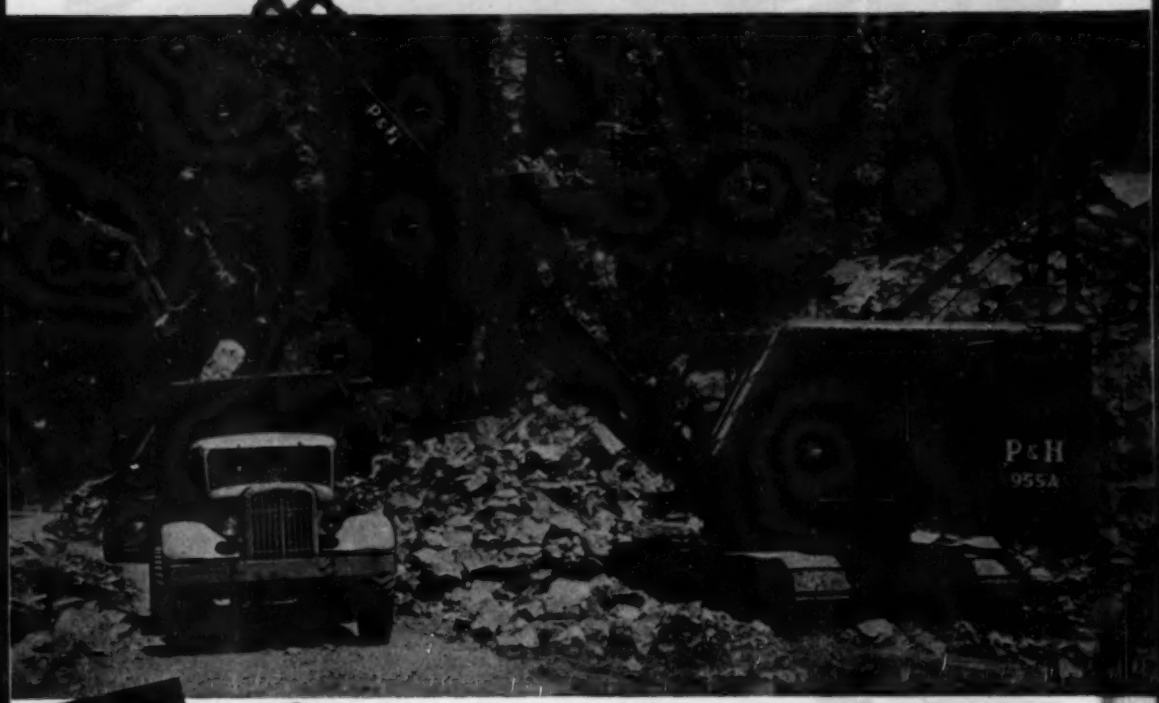

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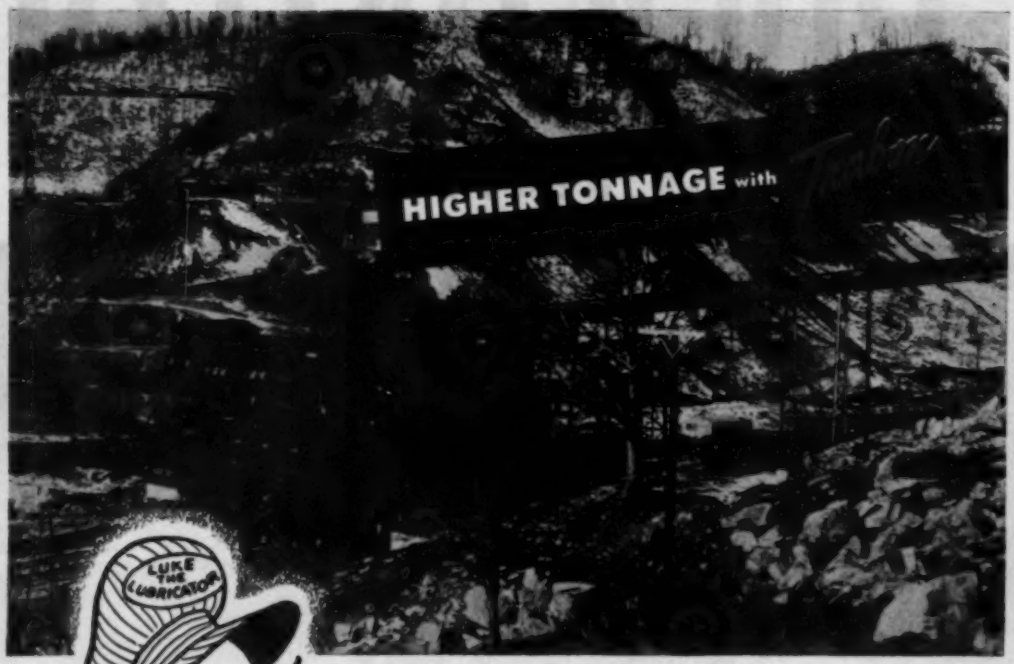

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"Voluntary" Amendment Boosts Bituminous Wages

A "VOLUNTARY AGREEMENT" amending the current bituminous contract to boost miners' wages by 20c an hour was signed Jan. 18 in Washington by operator and union representatives. It was the first time in some 30 yr that a new wage agreement had been effected in the bituminous industry without prolonged negotiations or a mine stoppage.

Effective Feb. 1, the wage hike of $1.60 a day increases the basic wage scale from $14.75 to $16.35. The amendment also provides for a fixed termination date of March 31, 1952, for the present contract but permits its continuation beyond that date until 60-day notice of a desire to terminate is given by either side. The new scale would add about 30c per ton to the cost of coal, it was estimated, and an increase of about 6% in the mine price was anticipated as a result. After several days of negotiation, anthracite operators and the union agreed Jan. 26 on a $1.60 increase for the 7-hr anthracite day.

The newly formed Bituminous Coal Operators' Association was reported to have played a major part in the negotiations, which were carried on without public announcement or reporting by the press. Those participating in the signing, in addition to Mr. Lewis, were: Harry M. Moses, BCOA president; Joseph E. Moody, president, Southern Coal Producers' Association; and Harry A. Treawell, president, Illinois Coal Operators' Association, who signed for that group and various operators in Wyoming, Kentucky, West Virginia and Virginia. An annual output of almost 400,000,000 tons was represented by Mr. Moses, Mr. Moody and Mr. Treadwell, and agreements covering the remainder of the tonnage were expected to be signed without delay.

"The UMWA and the representatives of the Bituminous Coal Operators' Association have been informally discussing this problem, which is climaxed with this agreement today, for a number of weeks," Mr. Moses said. "We had what seemed to be a serious business problem and we believe that we have attacked it and solved it in a business-like manner. We believe it's a constructive contribution to the needs and requirements of the industry itself, and to the economy of the nation in these strenuous times, and we look forward to a period of peaceful high-pressure coal production when and if it is needed by the Nation," he maintained.

Mr. Lewis confirmed Mr. Moses' statement, calling the amendment a "bread and butter" agreement as far as the mine workers were concerned. "Every economic and national consideration justifies the conclusions that have been reached," Mr. Lewis said. "The matter has been handled in a statesmanlike manner by the industry to the mutual advantage of both the operating interests and the mine workers and, we think, the country as a whole . . . and the country is now free from any thought of a so-called coal crisis for an indefinite period of time."

The agreement is "to the advantage of the public, the miners and the operators," Mr. Moody emphasized. "Even though there is no question but that the operators must increase the price of coal to the consumers, we feel that the consumers should have no complaint of such an increase, which will be small compared with that of the other commodities which they buy," he explained.

Whether the newly gained wage increases would be permitted to take effect Feb. 1 was not immediately determinable as the government announced its price and wage freezes Jan. 26. Under the orders, no changes in coal prices or wages were possible except as approved by the proper authorities. Early development of a wage formula that would permit "more flexibility" in specific industries, however, was indicated in the statements of government officials.

In negotiations, Mr. Lewis was re-

(*Continued on p 150*)

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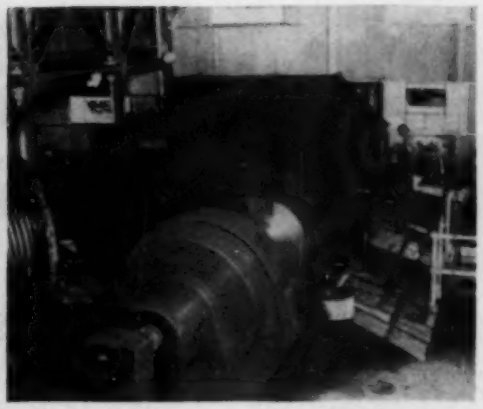
Wide World Photo

"NOW I THINK I'LL SIGN." John L. Lewis, UMWA president, is reported to have quipped, after Harry M. Moses (left), president, BCOA, and Joseph E. Moody (right), president, SCPA, had signed contract amendment giving miners an increase of $1.60 a day.



CHALKING UP A NEW MARK IN VERTICAL LIFT, this 3,290-ft slope belt recently installed at the new Orient No. 3 mine operates at 625 fpm to move coal at 1,200 tph up a 16-deg incline for a total lift of 868 ft. The 72-in head pulley is driven by a 1,500-hp synchronous motor (foreground, right photo). The fully mechanized mine is expected to be in full production shortly.

C. W. & F. Slope Belt Sets New Record

THE HIGHEST-LIFT BELT CONVEYOR IN THE WORLD, capable of moving 1,200 tons of coal an hour a vertical distance of 868 ft, has been installed at the Chicago, Wilmington & Franklin Coal Co.'s new Orient Mine No. 3, near Waltonville, Ill.

It was designed and manufactured by Goodyear Tire & Rubber Co. The previous record-lift belt, also designed and manufactured by Goodyear, conveyed coal a vertical distance of 729 ft.

C. W. & F's new completely mechanized mine will be one of the industry's most modern. It will employ belt conveyors throughout for a continuous flow of coal mined by the latest machines and most advanced techniques. Underground conveyor belts will carry coal to a 500-ton surge hopper, which will feed to the 42-in-wide slope belt. Conveyor belts also will handle the coal in all cleaning and sizing operations above ground.

Coal on the slope belt travels 625 fpm up a 16-deg incline 3,290 ft long to the mine tipple. The vertical height negotiated compares to that of a 75-story building. The slope belt weighs 89½ tons. Because of the enormous tension created by the big lift, 240 steel cables are utilized as strength-carrying members. Proper troughing characteristics are insured by the use of 23,648 lb of fabric in the belt's construction. The covers are made of 75,292 lb of high-quality rubber.

The combined belt and coal load of 194½ tons is moved at approximately 7 mph by a 1,500-hp synchronous motor which drives the 72-in head pulley through an eddy-current clutch.

Structure for the belt, built by Link-Belt, required 409,000 lb of steel. The complete system incorporates five impact-cushioning idlers, 38 self-aligning troughing idlers, 681 troughing idlers of three rollers each, 31 self-aligning return rollers and 400 return rollers. Assembly of the belt's structure required 1,400 lb of bolts.

C. W. & F. officials expect to have the mine in full mechanized production in the near future. Construction of top works, including cleaning plant and mine buildings, is progressing rapidly and coal is already being produced.

News in Brief

Explosion Kills 11 Miners

An explosion some 4,000 ft underground killed 11 miners Jan. 18 at the Burning Creek mine of the Burning Springs Collieries Co., Kermit, W. Va. Two other men also were injured, one critically. While the exact cause of the blast was not immediately determined, a gaseous condition was reported to be responsible for the disaster.

Big Utility Returns to Coal

The Consolidated Edison Co., of New York, last month announced that it had put all but three of its plants back on coal, even where the plants were equipped to burn both coal and oil. The three plants still on oil are not set up to burn coal at all. The action of this large utility is typical of the swing back to coal by many utilities and industrial plants, it was indicated. In New York, increased use of coal had resulted in bid invitations so large that even big coal operators could not offer to meet contract requirements completely, it was reported. Appalachian Coals, Inc., in announcing a survey of industrial use, said that up and down the East Coast "the trend is more and more discernible toward 'minimum of oil and a maximum of coal.'" Industrial consumption of coal in November, 1950, was 26.2% above that of November, 1949, according to the USBM.

UMWA Surveys 22,000 on Safety

In an attempt to get at the direct cause of accidents, the UMWA last month was preparing to mail a 56-p questionnaire to some 22,000 anthracite miners, Michael J. Kosik, president, District 1, told 100 safety committeemen from the union's third inspection district Jan. 16. Coal companies are a part of the plan, Mr. Kosik reported, and no worker is to be penalized for any information he may supply. The questionnaire need not be signed, but all workers were to be encouraged to give complete information. The survey is part of the union's program for reducing anthracite fatalities.

(*Continued on p* 170)

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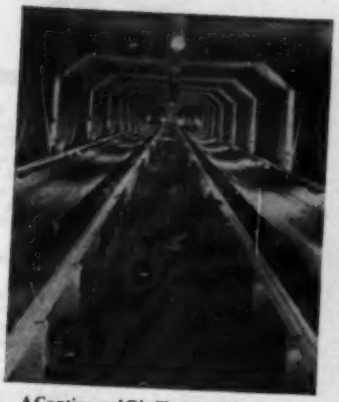

A Continental Gin Twin Belt Conveyor installation. Each conveyor, with Timken bearing equipped Continental Idlers, handles 20,000 bushels of wheat per hour.

Bartlett-Snow provides for minimum maintenance by mounting idlers of this conveyor on Timken bearings. Belt handles 250 tons per hour.

This inclined conveyor carries 800 tons of coal per hour. The Webster idlers are equipped with Timken bearings.

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Mr. L. Arrington, whose photograph is reproduced above, is Chief Electrician for Olga Coal Company, Caretta, West Virginia. As do many others in his field, Mr. Arrington looks to McGRAW-HILL'S PRE-FILED MINING CATALOGS for information that is helpful in his work — and finds it there — as is evident from his recent comment:

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SAND PUMPS
CONDITIONERS

PARTICIPANTS IN LAND-USE FORUM featuring the annual meeting of the Ohio Reclamation Association included (l to r): Larry Cook, executive vice president of the association, who presided; R. L. Ireland, chairman of the executive committee, Pittsburgh Consolidation Coal Co.; Henry F. Hebley, Pittsburgh Consol director of research; and R. T. Laing, executive director, Central Pennsylvania Coal Producers' Association.

Ohio Land-Use Group Scans Progress

RECLAIMING STRIP LANDS, planting trees, protecting wildlife and game, promoting interest in forestry, engaging in public-service projects and supporting land-use research were highlight subjects at the 1950 annual meeting of the Ohio Reclamation Association, Columbus, Ohio, Dec. 12. In addition, the association announced the award of five bronze plaques to Ohio journalists for their promotion of wise use of natural resources and accepted for itself a special citation from the Western Reserve Chapter of Friends of the Land for outstanding accomplishments in land conservation.

Following a morning business session and a noon luncheon featuring addresses by David C. Warner, water consultant, Ohio Department of Natural Resources; and Robert T. Laing, executive secretary, Central Pennsylvania Coal Operators' Association, a forum discussion reviewed achievements in land use and staked out new areas for study and action.

Principal speakers in the forum were: Clay Stackhouse, vice president, National Soil Conservation District Supervisors; Glenn Montgomery, president, Outdoor Writers of Ohio; William Laybourne, secretary, Ohio Forestry Association; Dr. Charles Dambach, chief, Division of Wildlife, Ohio Department of Natural Resources; Chester Hutchinson, assistant dean, College of Agriculture, Ohio State University; Dr. A. G. Chapman, chief, Division of Forest Management, Central States Forest Experiment Station; Zoyd Fialer, chief, Division of Reclamation, Ohio Department of Natural Resources; R. L. Ireland, chairman, Executive Committee, Pittsburgh Consolidation Coal Co., and chairman, Land Use Committee, American Mining Congress; and Henry F. Hebley, consultant, Pittsburgh Consolidation Coal Co. Larry Cook, executive secretary of the association, presided at the forum.

Milestones in the association's advance, summarized in the forum, included the following:

1. Continuing studies in strip-land characteristics and reactions of plantings to various conditions, culminating in publication of a summary of findings entitled *Rehabilitation of Lands Stripped for Coal in Ohio.*
2. Extension of a grant to Ohio State University for research on wildlife on strip-mine lands.
3. Distribution of small trees among schools in mining districts for planting on Arbor Day, with probable extension of the program to a wider area at an early date.
4. Sponsorship of an essay contest on conservation, with a wrist watch awarded to the winning student and a six-weeks course in conservation awarded to the teacher of the winning student.
5. Open houses, tours and visits to reclaimed lands, laboratories and nurseries for many groups.
6. Establishment of a soil and water laboratory at Cadiz, with facilities available without charge to county agents and soil-conservation technicians.
7. Distribution of Christmas trees made available by thinning the plantings on strip-mine banks.
8. Underwriting basic expenses of a forestry camp for boys sponsored by the Ohio Forestry Association.
9. Speeches before civic groups and others and testimony before Congressional and legislative committees.

MEETINGS

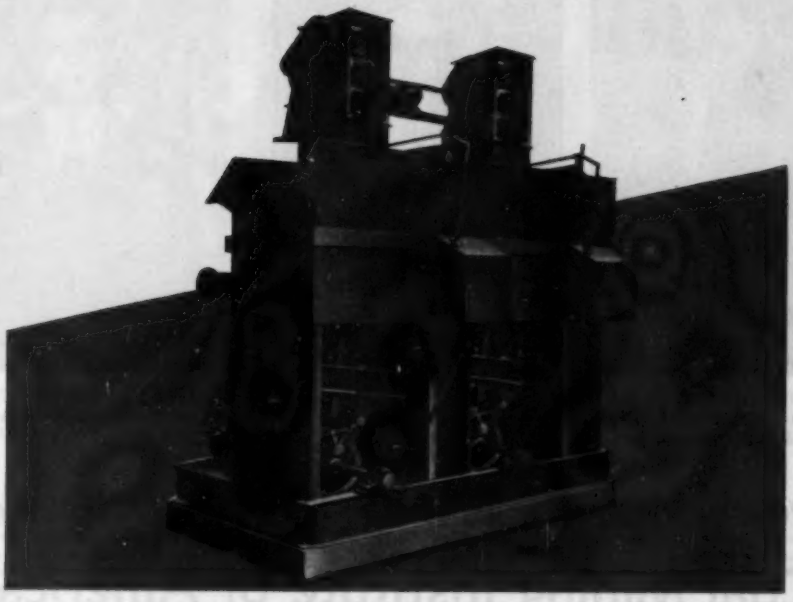
- AIME: annual meeting, Feb. 18-22, Jefferson Hotel, St. Louis, Mo.
- Canadian Institute of Mining and Metallurgy: annual meeting, Apr. 9-11, Chateau Frontenac, Quebec.
- ASME: spring meeting, Apr. 2-5, Atlanta-Biltmore, Atlanta, Ga.
- National Coal Association: annual meeting, April 19-20, Waldorf-Astoria Hotel, New York City.
- American Mining Congress: coal convention and exposition, May 14-17, Public Auditorium, Cleveland.

Personal Notes

J. A. Hunt, vice president in charge of operations, The New River Co., Mt. Hope, W. Va., has been named executive vice president of the company. **C. R. Bourland**, formerly assistant to the vice president, has been appointed vice president in charge of operations, to succeed Mr. Hunt. **J. M. McCauley**, formerly manager of mines, has been named vice president in charge of personnel.

John S. Palin, general superintendent, Francis and Carpentertown mines and the Standard coke plant of the Greensburg Connellsville Coal & Coke Co., Burgettstown, Pa., retired Jan. 1. Mr. Palin had been associated with the Baton interests for some 25 yr, first joining the organi-

(*Continued on p* 152)



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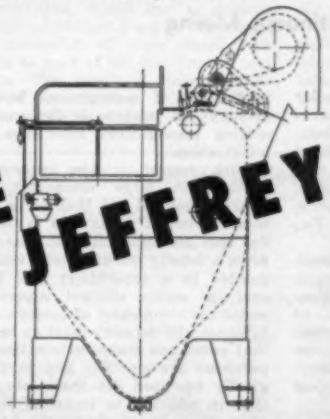

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SUPERVISORY TRAINING: G. M. Thursby, vice president—industrial relations, H. C. Frick Coke Co., Pittsburgh, Pa.

COAL PREPARATION: James Hyslop (left), president, Hanna Coal Co., St. Clairsville, Ohio, and F. P. Calhoun, assistant production manager, Rochester & Pittsburgh Coal Co., Indiana, Pa.

Coal's Progress and Opportunity Surveyed at 64th Annual Meeting of . . .

Coal Mining Institute of America

- Supervisory Training
- Color Dynamics
- Dust Suppression
- Coal Preparation
- Continuous Mining

SUPERVISORY TRAINING, color dynamics for coal, modern preparation plants, dust control in roof-bolting and the advantages and problems of continuous mining were topics surveyed at the 64th annual meeting of the Coal Mining Institute of America, William Penn Hotel, Pittsburgh, Pa., Dec. 14-15.

Officers elected for 1951 are: president, G. A. Shoemaker, Pittsburgh Coal Co.; vice presidents, D. J. Keenan, Pennsylvania Department of Mines, H. P. Greenwald, U. S. Bureau of Mines, and J. J. Snure, Rochester & Pittsburgh Coal Co.; secretary-treasurer, J. M. Lowe, Hillman Coal & Coke Co.

Following the Thursday morning business session, institute members heard G. M. Thursby, vice president, H. C. Frick Coke Co., Pittsburgh, Pa., describe his company's program of supervisory training. M. L. Coulter, consulting engineer, Indiana, Pa., and retiring institute president, was chairman.

The purpose of supervisory training, Mr. Thursby said, is to interchange ideas within the management group to create mutual benefits advantageous to management as a whole. Such training is a natural advance in the art of management brought about by an increase in the area requiring management knowledge and information.

With regard to the supervisory problem in large companies, Mr. Thursby pointed out that for a long time the industry has held to the belief that management's job was done when a legally qualified man was appointed to a supervisory job. However, to secure efficient supervision under the complexity of modern management, the industry must go beyond that point and make certain that supervisors are mentally and psychologically equipped for their jobs, and that in addition to technical knowledge, they have adequate schooling in human relations.

On the question of which supervisors should be included in the conferences, Mr. Thursby said that in small companies it may be advisable to limit participation to supervisors below the grade of mine foreman because superintendents and mine foremen probably would have much to do with planning and operating the program. In large companies, however, planning usually is the responsibility of top management, so it is advisable to have superintendents and mine foremen participate in a pilot course. This approach acquaints higher supervisors with the program in which the officials who work under them will participate.

"While advice and counsel from outside agencies is desirable," Mr. Thursby said, "the responsibility for planning and operating the program cannot be avoided by management if successful results are to be obtained."

In regard to subject matter, Mr. Thursby favored a course divided into three major sections:

1. Industrial Relations .....24 hr
2. Safety and Operations.....24 hr
3. Accounting .....12 hr

Two 2-hr conferences per week, arranged for the convenience of the participants, would provide a 15-wk program for upgrading supervision.

"How well the supervisor does his job and the efficiency he attains depend upon how well we equip him to do the job," Mr. Thursby concluded.

At the Tuesday afternoon session, "Color Dynamics in Industry" was the subject of a paper by J. C. Thompson Jr., assistant general paint manager, Pittsburgh Plate Glass Co., Pittsburgh, Pa., and a two-part paper, "Description of Coal Preparation Plants," was presented by James Hyslop, president, Hanna Coal Co., St. Clairsville, Ohio, and F. P. Calhoun, assistant production manager, Rochester & Pittsburgh Coal Co., Indiana, Pa.

Energy of precise colors in precise locations has increased safety and efficiency in many industries and will provide the same benefits for the coal

DUST SUPPRESSION AND CONTINUOUS MINING: D. J. Keenan (left), Pennsylvania Dept. of Mines; E. C. Anderson, electrical engineer, H. C. Frick Coke Co.; M. H. Forester, vice president, Pittsburgh-Consolidation Coal Co.; C. W. Owings, mining engineer, U. S. Bureau of Mines; C. W. Thompson, manager, National Mines Corp.; and W. A. MacCalla, industrial power engineer, West Penn Power Co.

industry if properly used on permanent installations at coal properties, Mr. Thompson said, in pointing out that color dynamics has been applied in the preparation plant at Harmattan mine, Fairview Collieries Corp., Danville, Ill., and Johnson Coal Cubing plant, Detroit, Mich.

Using charts and color cards to illustrate, Mr. Thompson explained the functions of different colors in creating illusions of greater space, delineating critical from non-critical machine parts and serving as identification markings for plant utility lines. Color dynamics was further defined by Mr. Thompson as the opposite of camouflage.

Pointing out that proper use of color is another facet of human engineering, Mr. Thompson cited some of the advantages in this field, such as increased safety, better housekeeping, lower turnover and reduced physical fatigue, which is a direct result of eye fatigue.

Outlining the design and theory governing a new 1,500-tph preparation plant now being built by Hanna Coal Co., St. Clairsville, Ohio, Mr. Hyslop stated that equipment choices were predicated on influencing factors as follows:

1. High-ash material is concentrated in the minus ¼-in sizes, and particularly in the minus 1/16-in sizes.

2. A considerable volume of banded material in the coarser sizes creates the problem of high coal loss in refuse.

3. Bony material in the 1¼x¼ requires close gravity control for best results.

4. The volume of coal to be washed is such as to require multiple units, making practical the selection of different units for the various sizes.

5. The raw-coal feed to the plant is often wet, making dry screening impractical.

The plant feed, which is run-of-mine strip coal and varying quantities of ¾x0 coal from an underground mine, is carried from the dump hopper to the plant on a 60-in belt.

Plus 7-in will be handpicked and loaded to railroad cars or crushed and rescreened with plant feed. Coarse sizes, 7x1¼-in, will be cleaned in two McNally-Mogul jigs, each with a capacity of 350 tph. The 1¼x¼ material is fed to a 500-tph 16½-ft Chance cone, which has an experimental middlings draw to determine the possibility of using these middlings as part of the fuel for the heat driers. The minus-¼ fines will be cleaned in Deister Diagonal-Deck tables. Shaking screens are used in wet screening in preference to vibrating screens, Mr. Hyslop said, because of the high cost of screen cloth to handle the highly-abrasive material in the feed. Mr. Hyslop listed the advantages of this system of treatment as (1) thorough removal of all fines from Chance-cone feed, (2) elimination of difficulties arising from wet plant feed, and (3) accumulation of high-ash fine clay at one point to prevent its being scattered throughout the plant.

A 72x50-ft sludge tank, with eight chain conveyors having flights 8 ft wide, conditions the feed for the tables by reducing moisture in ¼x0 fines to 25% and by providing for the

(*Continued on p 193*)

What's Happening to Coal and Business Activity

Coal Production		1951 to This Date	1951 Over 1950, to Date
Est. anthracite prod., week ending Jan. 13	952,000	1,727,000	+63.7%
Est. bituminous prod., week ending Jan. 13	11,860,000	21,865,000	+67.4%

Source: U. S. Bureau of Mines.

	Bituminous Coal Stocks (Thousands, net tons)				Consumption (Thousands, net tons)		
	Dec. 1, 1950	Days' Supply	Nov. 1, 1950	Dec. 1, 1949	Nov., 1950	Oct., 1950	Nov., 1949
Electric power utilities	27,329	56	26,668	18,508	8,451	8,196	6,416
By-product coke ovens	16,329	61	15,656	10,060	8,006	8,480	5,033
Beehive coke ovens	.....	...	.....	.....	873	1,000	52
Steel and rolling mills	1,005	43	989	907	688	611	521
Cement mills	1,361	52	1,283	1,001	749	705	567
Other industrials	10,652	61	10,936	9,249	9,176	8,560	8,212
Railroads (Class I)	4,507	25	4,172	4,004	5,329	5,350	5,080
Retail dealers	2,742	12	2,764	1,445	6,763*	5,985*	8,605*
Total	72,125	54	70,478	45,264	40,015	38,887	34,586

Source: U. S. Bureau of Mines. *Retail dealer deliveries.

Business Activity	Latest Week*	Month Ago	Year Ago
Business Week Index of Business Activity, wk. ending Jan. 13	231.2	229.8	194.8
Steel ingot operations (% of capacity)	99.6	100.8	93.0
Electric power output (million kw-hr)	6,961	6,985	6,029
Crude oil production (daily avg., 1,000-bbl.)	5,762	5,723	4,925
Misc. and L.C.L. carloading (daily avg., 1,000 cars)	77	77	65
All other carloadings (daily avg., 1,000 cars)	50	51	39
Prices, spot commodity index (Moody's, Dec. 31, 1931 = 100)	522.1	498.9	350.8
Prices, industrial raw materials (B.L.S., Aug., 1939 = 100)	375.4	351.0	223.1
Prices, domestic farm products (B.L.S., Aug., 1939 = 100)	397.8	374.5	298.9
Prices, finished steel composite (*Iron Age*, lb)	4.131c	4.131c	3.837c
90 stocks, price index (Standard & Poor's Corp.)	169.0	156.4	133.1

*Date of latest week for each series on request.

Among the Manufacturers

Link-Belt Opens New Pittsburgh Factory Branch

TO PROVIDE BETTER SERVICE in the greater Pittsburgh area, Link-Belt Co. has constructed and is now operating a new factory-branch store at 5020 Centre Ave. Conveniently located 3 mi from the Golden Triangle, and only one block from the well-known intersection of Morewood Ave. and Baum Blvd., the new building provides ample space for stocking Link-Belt products and serves as headquarters for increased Pittsburgh personnel. It is under the supervision of Otto W. Werner, district manager.

Hulburt Oil & Grease Co., Philadelphia, acquired the Crescent Lubricating Co., Huntington, W. Va., Jan. 1. Larry Ferrell, former Crescent owner and president, has been named a vice president in the Hulburt sales department and will continue to reside in Huntington. He organized the Crescent company 15 yr ago and prior to that had spent 15 yr in the Hulburt organization.

Roberts & Schaefer Co. has appointed Laning Dress as an assistant to John E. Kalinka, executive vice president in charge of engineering, construction and operation in connection with execution of contracts. Mr. Dress, a mechanical engineering graduate of Bucknell University, has been employed for the last decade in the mining field in various engineering positions, and for the last 5 yr was preparation engineer for the Binkley Coal Co., Chicago.

Ralph K. Gottshall, assistant general manager of the explosives department, has been appointed assistant to the president, Atlas Powder Co., Wilmington, Del. Mr. Gottshall, who will be assigned to general administrative duties with headquarters in Wilmington, joined Atlas as a chemist in 1927 and became assistant general manager of the explosives department in 1948. D. J. C. Copps, formerly manager of the Joplin district sales office and recently on special assignment in the explosives department, has been appointed assistant general manager to succeed Mr. Gottshall.

Richard C. Goss, 52, district manager, Ohio Brass Co., died suddenly Dec. 29 at Pittsburgh, following a heart attack. Mr. Goss joined Ohio Brass in 1925 and was appointed a district manager in its mining division in 1932.

John W. Belanger and Nicholas M. DuChemin have been made general managers of the Large Apparatus and Small Apparatus Div., respectively, of the General Electric Co.'s Apparatus Dept. Associated with GE for many years in various executive positions throughout the company, both men formerly were assistant general managers of the department. The appointments mark an integration of the Apparatus Dept. into three basic units, according to Henry V. Erben, GE vice president who supervises the divisions. The third unit, the Marketing Div., which handles marketing operations for all products of the department, will continue under Chester H. Lang, company vice president and manager of marketing for the department.

W. H. Davis has been named manager of the Chicago district office of the Simplex Wire & Cable Co., Cambridge, Mass. Mr. Davis, who has been associated with the company since 1927, succeeds J. N. Macalister, who is retiring after 47 yr with Simplex, the last 17 of which as Chicago district manager.

1951 marks the Stephens-Adamson Mfg. Co.'s 50th year in the production of materials-handling equipment at its Aurora, Ill., plant. The company began operations in a single 80x120-ft building in June, 1901, and today occupies a 13-acre site with 230,000 sq ft of plant space. Branch plants are located at Los Angeles, Calif., and Belleville, Ont., with sales offices in principal cities in the United States and throughout the world. During its past 50 yr of design, engineering and installation work, the company has made many important contributions to progress in materials-handling in many fields.

Howard E. Maloney has been named manager of sales, Electrical Wire Div., John A. Roebling's Sons Co.,

(*Continued on p* 184)

COAL MEN ON THE JOB

INSPECTING THE NEW UNDERGROUND SHOP at No. 9 mine, Old Ben Coal Corp., W. Frankfort, Ill.: Homer Mittendorf (left), Melvin Reuter and James Lahdi, Clarkson Mfg. Co.; C. E. Van Slyck, electrician, Old Ben No. 11; Nick Kovaleski, No. 9 shop foreman; and Frank Eubanks (rear), Old Ben maintenance superintendent.

More Coal Men Photos on pp 162 and 193

Does cold weather put the freeze on your operations?

THESE SHOVELS CAN KEEP ON WORKING EVEN AT LOW TEMPERATURES

they're built with U·S·S TRI-TEN

HERE'S good news for power shovel users. In U·S·S TRI-TEN (manganese-nickel-copper steel) manufacturers of heavy duty excavating equipment have found a high strength structural steel with which they not only can reduce weight and increase strength but at the same time give vital operating parts the ability to withstand shock in low temperature service. Every contractor who has been plagued by part breakage during severe cold spells will appreciate what this means.

Here's what Harnischfeger Corporation has to say about U·S·S TRI-TEN:

"We have used U·S·S TRI-TEN principally in our excavator products. The continual trend to increased loading capacities together with more severe field service has greatly accelerated the use of this type of U·S·S High Strength Steel.

Our excavator design requires that the steel must have high yield and tensile strength, good corrosion resistance, and also must stand up at normal and sub-zero temperatures.

It must possess a high strength-to-weight ratio, good resistance to abrasion. Full size structures must exhibit high resistance to fatigue failure. The steel must, in addition, lend itself to economical fabrication and machining.

Our experience with P&H 1400 Excavator—in which TRI-TEN is used in dipper sticks, dipper, and in other stressed members—has shown that this steel satisfies all these requirements without adversely affecting the cost of our products.

Generally speaking, we have found that by replacing ordinary structural steel with TRI-TEN, the weight of our component parts has been reduced 25% Allowable working stresses have been increased 50%—from 16,000 to 24,000 psi. TRI-TEN has enabled our P&H 1400 customers to operate this equipment in temperatures as low as minus 45°F.—which would have been impossible with ordinary structural steel."

If you would like to know how you can use TRI-TEN or the other U·S·S High Strength Steels to give you similar worthwhile results, write us.

U·S·S TRI-TEN is one of the family of U·S·S High Strength Steels which are suited to many of your special requirements. And, for even more stringent applications, we can also furnish U·S·S CARILLOY and U·S·S STAINLESS steels which are especially adapted to unusual jobs of industry. Our metallurgists will be glad to work with you to help you select the steel best suited to your job.

AMERICAN STEEL & WIRE COMPANY, CLEVELAND · COLUMBIA STEEL COMPANY, SAN FRANCISCO
NATIONAL TUBE COMPANY, PITTSBURGH · TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM · UNITED STATES STEEL COMPANY, PITTSBURGH
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

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at the working face . . .

GIVE 'EM AIR

at the lowest possible cost

Above ground it's free, but down in the bowels of the earth, where men mine the pay-lode or build tunnels for the benefit of humanity, *AIR* and its *DELIVERY COST* are vital factors.

SPIRATUBE-M and AYRTUBE cut Air Delivery Costs. Made specifically for mine and tunnel ventilation, these two new *AIRDUCTS* working individually or in combination, deliver a maximum cubic measure of air right at the working face and at the lowest possible cost—because—ease of handling reduces installation costs, and construction features minimize leaks and seepage. You get the full volume created by your fans and blower units right where you need it—at the working face—reducing power costs.

Immediately available in tough high count jute and other fabrics, all specially treated and heavily coated inside and out to withstand fungus and mildew and rough usage.

Extremely flexible special (patented) built-in couplings eliminate fabric mangling—parts are never laying about to create accident hazards.

SPIRATUBE-M and AYRTUBE save labor—cut fatigue—step up output—cut maintenance costs.

SPIRATUBE-M — (DIAMETERS to 30 INCHES) Especially designed for both positive and negative pressure, or reversible systems. Replaces rigid ducts. Offers great savings in shipping, installation, maintenance, and storage costs. Patented concealed spring wire construction springs to work and stays extended. Built-in quick couplings with joints lock ringed against blast concussion. No fittings required for turns or bends.

AYRTUBE — (DIAMETERS to 36 INCHES) Heavy duty pressure ventilation tubing without wire reinforcement. Quick coupling ends and lock rings interchangeable with SPIRATUBE-M. Materials and constructions meet Flexible Tubing Standards. Full line of special fittings available.

Flexible Tubing Corporation, Guilford, Conn.—Dept. B

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SPIRATUBE

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Title.....

Company.....

Address.....

5K-12A City.....Zone....State.....

Equipment Approvals

Nine approvals of permissible equipment were issued by the U. S. Bureau of Mines in December, as follows:

Goodman Mfg. Co.—Type 52-T Timberman; one 10-hp motor, 500 v, dc; Approval 2-686A; Dec. 5.

Joy Mfg. Co.—Type X707-17 Model 1-19 Axivane fan electric-drive unit; one 3-hp motor, 230 v, dc.; Approval 2-771; Dec. 13.

Goodman Mfg. Co.—Type 712CL3 or EL3 shortwall mining machine; one 50-hp motor, 500 v, ac; Approval 2-772A; Dec. 13.

Joy Mfg. Co.—Type 3JCM-2BE/F and 3JCM-3E/F Continuous Miners; seven motors, two 65 hp, three 7½ hp, and two 5 hp; 250 and 500 v, dc; Approvals 2-773 and 2-773A; Dec. 14.

Joy Mfg. Co.—Type 20BU-1E loading machine; two 15-hp and two 5-hp motors, 250 v, dc; Approval 2-774; Dec. 19.

Ingersoll-Rand Co.—Type 100-hp mine-car compressor; one 100-hp motor, 500 v, ac; Approval 2-775-A; Dec. 22.

Homestead Valve Mfg. Co.—Homestead-Yeager all-electric steam cleaner; 50 kw, 230 or 440 v, ac; Approvals 2-776 and 2-776A; Dec. 22.

Joy Mfg. Co.—Type U-166-62H belt conveyor; one 15-hp motor, 440 v, ac; Approval 2-777A; Dec. 28.

Thomas A. Edison, Inc.—Officials' flash lamp; Approval 617; Dec. 26.

Bituminous Wages . . From p 139

ported to have asked for a reduction in the working day and an increase in payments to the Welfare Fund, in addition to the wage boost. Operator representatives, however, were said to have balked at anything but a change in the wage scale. The approximate 10% increase was settled by "negotiation," Mr. Moses reported in making it clear that the union had asked for the change. "The operators had a contract. They were happy with it," Mr. Moses said.

Mineworkers represented by the PMWA will receive a similar wage increase, following an agreement between the PMWA and the Coal Producers' Association of Illinois, announced by John Marchiando, union president. Mr. Marchiando also announced that after 3 yr of negotiations an agreement had been reached to provide pensions of $60 a month, including Social Security payments, to members who had retired because of old age or disability before June 1, 1946. Widows of miners who retired before that date also will receive similar pensions. The agreement does not affect miners who retired after June 1, 1946, and receive pensions of $100 monthly.

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Quality Value Service

Hose built for the job! That's the reason for Thermoid's excellent reputation among users of hose.

Our customers know they can rely on Thermoid's recommendations . . . whether it's for air, suction, hydraulic, welding—or any of the many types of Thermoid hose built for the coal mining industry.

And men who buy these quality products like the service they get from Thermoid's experienced distributors and sales representatives—and their intimate knowledge of the *buyer's* problems.

Get the hose built for *your* job. Specify Thermoid.

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F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

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PREFERRED!

BY MANY SMALL MINES
FOR GATHERING AND
MAIN HAUL SERVICE

ATLAS 3-TON TYPE-F

ONLY 30" HIGH

VERY LOW MAINTENANCE
ATTRACTIVE FIRST COST
SURPRISING PERFORMANCE

TWO MOTORS
NO CHAINS — NO WORMS — NO BEVEL GEARS
JUST THE PLAIN SPUR GEARING WHICH HAS
MADE ATLAS PERFORMANCE UNEQUALLED

THIS LOCOMOTIVE IS REALLY GOOD . . . *ASK:* —

Mr. J. S. Wolford of Pine Grove Coal Co., New Philadelphia, Ohio
Mr. B. Smigel of Smigel Coal Co., New Philadelphia, Ohio
Mr. W. Hess of The H & H Coal Co., Dixonville, Pa.
Mr. C. H. Hooker of The S. & H. Coal Co., Uhrichsville, Ohio

Complete details and specifications on request.

THE ATLAS CAR & MFG. CO.

T.C. & I. Officials Move Up

ARTHUR V. WIEBEL, vice president in charge of operations, Tennessee Coal, Iron & R.R. Co., became president Jan. 1, succeeding Robert Gregg, retired. Previously assistant to the vice president in charge of engineering and operations of the U. S. Steel Co. of Delaware, Mr. Wiebel joined T.C. & I. in 1946. John Pugsley, controller, was named executive vice president of the company.

JAMES C. GRAY, assistant manager of raw materials since 1948, was appointed manager of manufacturing, succeeding J. M. Spearman, who was named vice president in charge of operations, replacing Mr. Wiebel. Mr. Gray joined the company in 1937 as superintendent of the Wylam mine. In 1940 he was made chief inspector of the coal mines division and advanced to general superintendent of coal mines in 1943.

Personal Notes . . . From p 144

zation in 1925 as mine foreman. **Clinton C. Cornelius** has been appointed to succeed Mr. Palin, according to an announcement by **Charles B. Baton**, president.

Dennis J. Keenan, Pennsylvania state mine inspector for the past 13 yr, with headquarters in Barnesboro,

ALL ROPES *look* ALIKE... but

IN

Carbon Content is Determined on Scales that can Weigh a FINGERPRINT

Scales so sensitive they can weigh your finger print—that's a typical example of the exacting control we maintain over steel that goes into Wickwire Rope.

Because of such precision analysis and testing, we're able to hold and maintain carbon content of steel within five points (.05%) of the appropriate value for each of our commercial grades of wire rope. That's mighty important—because correct carbon content of steel determines its strength, toughness, ductility, hardness and uniformity of grain size to McQuaid-Ehn* standards.

Basic control like this is possible only with a fully integrated company like Wickwire where manufacture of wire rope starts with the actual making and refining of the steel.

Thus, Wickwire goes "beyond specifications" to supply you with wire rope that has no equal for longer life, utmost safety and enduring reliability.

Look for the YELLOW TRIANGLE on the reel

*Write for detailed information on the McQuaid-Ehn test to Wire Rope Sales Office, Palmer, Mass.

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A PRODUCT OF THE WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL AND IRON CORPORATION

WIRE ROPE SALES OFFICE AND PLANT—Palmer, Mass. EXECUTIVE OFFICE—500 Fifth Avenue, New York 18, N. Y.

SALES OFFICES—Abilene (Tex.) • Boston • Buffalo • Casper • Chattanooga • Chicago • Denver • Detroit • Emlenton (Pa.) • Houston • New York • Odessa (Tex.) • Philadelphia • Phoenix • Salt Lake City • Tulsa

PACIFIC COAST SUBSIDIARY—The California Wire Cloth Corporation, Oakland 6, California

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"FIST-GRIP" CLIPS

YOU'RE ASKING FOR TROUBLE! Here's Proof!

WRONG and RISKY!

Tightening of nuts on ordinary U-bolt clips pulls wire rope into bowed shape, crushes rope, endangers safety.

In use, rope between U-bolt clips is crimped under tension, leading to further damage and early breakage.

Laughlin "Fist-Grip" Safety Clips grip the rope in four bearing-surfaces, holding it straight without damage or distortion.

Keeping the rope straight under working tension, "Fist-Grip" Clips deliver 95% to 100% of the rope's rated breaking strength.

RIGHT and SAFE!

You Get All These Benefits Only With "FIST-GRIP" Clips

Won't crimp or crush — pre-formed or regular lay wire rope; leaves them full strength for safety and longer life.

Simple, easy to put on — saves time, manpower; can be put on with *any* type wrench.

100% foolproof — can't be put on backward.

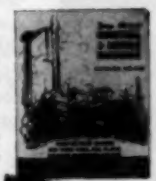
Sure grip — two clips do the work of three.

Extra strength and safety — only type of clip where entire clip, including bolts, is drop-forged.

Distributed through mine, mill and oil field supply houses.

Get This Valuable FREE Data-Book

Use the coupon below for Laughlin Catalog-Data Book, telling how to select the *right* wire rope or chain fitting for every job.



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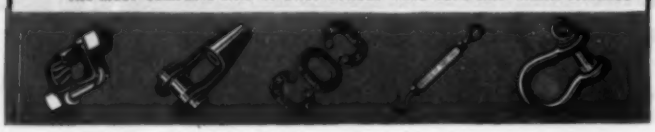
THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS



Pa., has been appointed general superintendent of the Sterling Coal Co., Bakerton, Pa., succeeding the late C. J. Hannigan. Mr. Keenan, who began his mining career at the age of 13, has been active in the industry for 41 yr. Previous to his service with the state, he was employed by various mines in the Johnstown area and for a short time in West Virginia. He is an officer of several mining organizations and has long been active in mine-rescue associations.

George E. Cleaver, associated with the Susquehanna Collieries Div. of the M. A. Hanna Co. and predecessor company for 52 yr of active service, retired Dec. 30 as superintendent of the No. 7 colliery, Nanticoke, Pa. Mr. Cleaver started to work for the company at the age of 14 as a breaker boy, becoming a supervisor in 1914. Since that time he has held various positions and has served as superintendent of several of the company's operations since 1933. **W. H. Moore**, superintendent of the Glen Lyon colliery, has been named superintendent, of No. 7, to succeed Mr. Cleaver. Mr. Moore joined the company in 1918 as a member of the engineering corps. He has since held varied supervisory posts and was made Glen Lyon superintendent Jan. 1, 1950.

Glen Alden Coal Co., has announced the retirement of **Charles E. St. John** as superintendent of its Exeter Shops. Mr. St. John joined Glen Alden as a mechanical engineer in 1921 on separation of its coal and rail interests. He was made superintendent of the Exeter shops in 1943 in addition to his duties as mechanical engineer and in 1947 dropped the latter duties to confine his work to the Exeter shops. **Henry E. Cuddeback**, associated with the company since 1923, has been promoted from shop foreman to superintendent, to succeed Mr. St. John. **Wallace L. Saunders**, formerly assistant to the superintendent of construction, has been promoted to assistant superintendent and plant engineer at the Exeter shops.

William Hardy, superintendent, Mine No. 58, Peabody Coal Co., Taylorville, Ill., retired last month after 37 yr of service with the company. Mr. Hardy had served as superintendent for the company for the past 22 yr. **J. E. Edwards**, mine manager at No. 58 since 1939, was named superintendent to succeed Mr. Hardy. **Phillip Petty**, formerly assistant mine manager, has been appointed mine manager.

Douglas W. Halstead has been appointed assistant superintendent of the Keen Mountain mine, Red Jacket Coal Corp., Red Jacket, W. Va. **S. A. Cook** has been promoted from section foreman to assistant general day foreman, and **John H. Damron** from safety inspector to assistant general night foreman at the Keen Mountain operation.

Clean Up The R.O.M.

. . . and WATCH COAL PROFITS ZOOM!

Clean coal—properly sized coal . . . it's a *must* for profitable sales today. Yes, and the Seco way of screening, sizing and cleaning is winning the acclaim of profit-wise producers everywhere. Hour after hour, day after day, year after year these ruggedly built Seco vibrating screens are preparing coal for top market prices at a cost of a few pennies per ton. It's a fact! You see the patented equalizer assembly sets Seco apart from any other piece of equipment of this type. Only Seco has fully controlled true circular action . . . for maximum tonnages and accurate screening . . . with no bobbing . . . no weaving . . . no bogging down under the load. Over 300 models with single, double, triple and three and one-half decks . . . and with screen openings to produce any and all desired sizes.

Check Your Coal Preparation Costs Now! A SECO field man will bring you helpful modernization information, or write for Coal Bulletin #11, Dept. C.

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SCREEN EQUIPMENT COMPANY, Inc.
1750 Walden Avenue, Buffalo 21, New York
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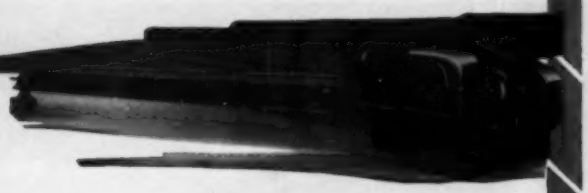
SuperDuty Eliminates 95% and More of Free Impurities



Operating at peak capacity, the *SuperDuty Diagonal Deck* Coal Washing Table efficiently removes from fine coal up to 95% and better of the free impurities, while at the same time losing less coal in the refuse than any other machine or process on the market.

This phenomenal performance, attributable in no small part to the diagonal deck design, has won for SuperDuty a place in practically every important new coal washing plant erected in recent years.

Matching its operating efficiency are low original cost, negligible upkeep expense—and extreme economy of power.

Write today for Bulletin 119 that contains full information.

CONCENCO SPRAY NOZZLES

These handy nozzles are simple, flexible and economical. All you do is drill your holes, clamp on and get results. They can be definitely aligned for washing, sluicing or spraying, according to need. They are removed or replaced in a moment's time.

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CONCENTRATOR
COMPANY
911 Glasgow Ave. • Fort Wayne, Ind., U.S.A.
CONCENCO PRODUCTS

★ *The ORIGINAL Deister Company* ★ *Inc. 1906*

William H. Angel, associated for some time with E. G. & F. A., has resigned to become general foreman of the Maryland Century Coal Co., Century, W. Va.

G. J. Burgess has been employed as a foreman at the Powellton No. 3 mine of E. G. & F. A. At Koppers-ton mine, **Robert Freeman**, formerly transit man at No. 1 mine, has been transferred to Powellton No. 3 as resident engineer, replacing **Robert Thomas** who now is mining engineer at this plant. **Solon I. Long** has returned to the Beards Fork mine to resume his duties as general mine foreman. **Estil R. Bartlett**, who was acting foreman during Mr. Long's absence, now is general night foreman. **J. R. Lewis**, machineman, has been promoted to moving foreman, and **Kenneth Robson**, car dropper, has been advanced to tipple foreman at Wharton No. 1 mine. At Wharton No. 2, **Glen McDaniel, Edward King, Clifford Harris** and **Wheatsel Barker** have been employed as face foremen. **Denny Ayers** and **Oren Secton** have been employed as section foremen at Page. **Kenneth Johnson** and **D. H. Scarbro**, who have been working at Powellton No. 6 since Midvale ceased operation, have been assigned to general foremen's duties at Page.

Stuyvesant Peabody Jr., president of Peabody Coal Co., has been elected chairman of the board of directors of the First Trust & Savings Bank of Taylorville, Ill. **Charles S. Ellis**, Peabody vice president, has been elected president of the bank.

Obituaries

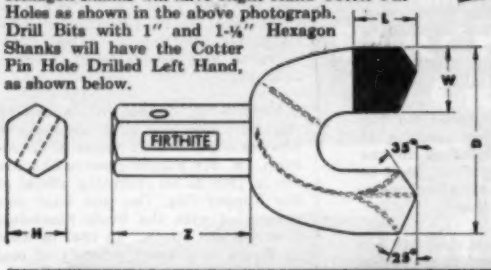
Lee C. Gunther, 78, president, Southern Appalachian Coal Operators' Association, died Dec. 30 at St. Mary's Hospital, Knoxville, Tenn., following an illness of several months. Mr. Gunther had been associated with the Southern Appalachian group for many years and had long been active in negotiations for national wage agreements. Prior to his entry into the coal industry in the early '20's, Mr. Gunther was prominently associated with construction projects in various parts of the world.

Aloysius F. Connell, 53, vice president and general manager, Repplier Coal Co., died suddenly Jan. 1 at his home in Pottsville, Pa., following a heart attack. Active in the mining industry for some 25 yr, Mr. Connell also was a member of the boards of the Thorne Neal Coal Co. and the Good Samaritan Hospital, Pottsville.

August F. Barbieux, 74, superintendent, Columbus No. 4 mine, Columbus Mining Co., Allais, Ky., died Dec. 21 at his home in Hazard after a brief illness. Widely known throughout Eastern Kentucky, Mr. Barbieux had been associated with the company in the Hazard field since 1917.

HEX-SHANK AUGER DRILL BITS

Unless otherwise specified—Drill Bits with 13/16" Hexagon shanks will have Right Hand Cotter Pin Holes as shown in the above photograph. Drill Bits with 1" and 1-⅛" Hexagon Shanks will have the Cotter Pin Hole Drilled Left Hand, as shown below.



DIMENSIONS IN INCHES						
Style No.	Shank Sizes			Tip Sizes		
	D	H	Z	L	W	Thickness
D-2¼-13	2-1/4	13/16	2-1/4	7/8	3/4	5/32
D-2½-13	2-1/2	13/16	2-1/4	1	13/16	5/32
D-2⅝-13	2-3/4	13/16	2-1/4	1	7/8	5/32
D-2⅝-16	2-3/4	1	2-1/4	1	7/8	5/32
D-2⅞-16	2-7/8	1	2-1/4	1	13/16	5/32
D-3 -13	3	13/16	2-1/4	1	1	5/32
D-3 -16	3	1	2-1/4	1	1	5/32
D-3 -18	3	1-1/8	3	1	1	5/32
D-3¼-18	3-1/4	1-1/8	3	1	1-3/32	5/32

Full line of SQUARE SHANK Firthite Auger Drill Bits in Auger Diameters ranging from 1¼" to 2¼"

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One three-drill tram drilled 404—8-foot holes *in 7½ hours* in coal having heavy sulphur streaks!

Cheaper DRILLING

A minimum of bit change time requirement—more drilling finished per hour—better and faster drilling *is cheaper drilling.*

R-191

Firth Sterling STEEL & CARBIDE CORPORATION
McKEESPORT, PA.

Now Available to the COAL INDUSTRY with either Round or Square Screen Openings

GILSON *Mechanical* TESTING SCREEN

The GILSON Testing Screen gives you prompt, accurate information about:

1. **Your finished product**
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Knowing these facts about your product — the fluctuating changes in your operations enable you to operate your plant intelligently and more economically.

This machine is designed for the efficient sizing of test samples. It accommodates samples up to one cubic foot, making from two to seven separations simultaneously, in five minutes or less.

The screen trays and dust pan are sturdy, built to stand rough usage —will not bend or warp. Screen surfaces (ASTM standards) are held under tension by a tightening arrangement which insures proper vibration and permits easy replacement.

As standard screen trays are usually too large for testing very fine materials, an attachment (shown below, left) may be furnished for using eight-inch testing sieves in conjunction with the vibrating unit.

Where exacting specifications are required the Gilson Screen eliminates guesswork — avoids errors and provides facts which reduce operating delays.

For fast, accurate sizing from 4" to 200-mesh specify a Gilson Testing Screen.

GILSON SCREEN CO. BOX 186 MERCER, PENNA.

C. J. Hannigan, 61, general superintendent, Sterling Coal Co., Bakerton, Pa., died Dec. 13 at the Miners' Hospital, Sprangler, Pa. Mr. Hannigan had been associated with the Sterling Coal Co. for 33 yr. He was a member of the board of directors of the Central Pennsylvania Coal Producers' Association and served on its educational committee.

Fred Hancock, 60, assistant superintendent, Clymer mine, Clearfield Bituminous Coal Corp., Clymer, Pa., died late in December of injuries sustained in a mine accident.

Bliss K. Wentworth, 56, associated with the C. W. & F. Coal Corp. for 27 yr, died Dec. 17 of a heart ailment. Mr. Wentworth, who had been in failing health for some time, was assistant to the superintendent at the company's New Orient mine at the time of his death.

Clarence S. Bissell, 79, founder and president, Black Diamond Coal Mining Co., Birmingham, Ala., died Dec. 12. A native of New York, Mr. Bissell moved south in 1902.

Clarence Gahagen, 59, president of the Gahagen Coal Co., Arrow Coal Corp. and G. E. Cherrington Coal Corp., all operating in central Pennsylvania, died Jan. 5 in Ft. Lauderdale, Fla.

Richard A. Suppes, 57, a mining engineer, died Jan. 12 at his home in Charleston, W. Va. A native of Johnstown, Pa., Mr. Suppes came to Charleston in 1926 as an operating official of the Kopper Coal Co., and later was associated with the Brule Smokeless Coal Co. and others. In 1949 he went to Korea to prepare a study of coal mining in that country for the Korean government.

George Watkins Evans, 74, Seattle mining engineer, died Jan. 11 in Seattle, Wash. Mr. Evans began working in coal mines in Washington when he was 11 and had no schooling until he began studying by himself at the age of 17. Before being graduated from Washington State College in 1912, he had gone to Alaska and the Yukon in search of coal, had worked in Colorado mines and had become a consulting engineer for the USBM. He had since served as a staff member of the Bureau's Northwest Equipment Station and engaged in consulting engineering work.

Association Activities

Appalachian Coals, Inc., has announced the resignation of W. J. Cunningham, president, Crummies Coal Co., as member of its board of directors. A member of the ACI board since its inception, Mr. Cunningham resigned to curtail his ac-

Crush Coal to Desired Size...

TO MEET ALL MARKET DEMANDS!

the EFFICIENT ECONOMICAL and PRACTICAL WAY

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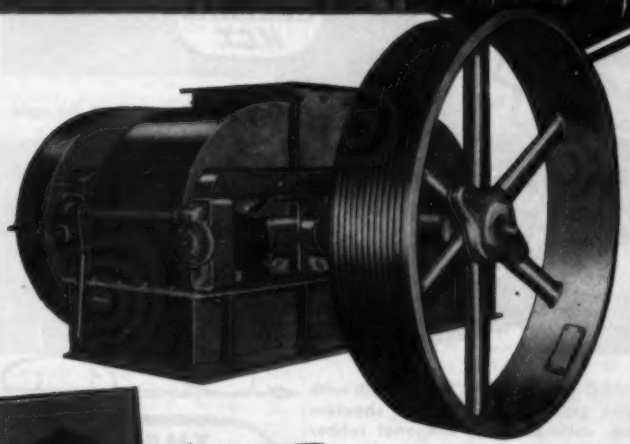
Single and Double Roll

BLACK DIAMOND CRUSHERS



Used extensively throughout the anthracite and bituminous coal fields, these dependable McLanahan Black Diamond Crushers crack large or small lumps of coal or other materials to desired size with a minimum of fines. These machines are the answer to your coal crushing problems, and are built to handle high tonnages. Available in numerous sizes and types, these single and double roll crushers are constructed of steel, semi-steel, or fabricated steel, with babbitt or bronze bearings for a long life of satisfactory service.

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Dependable Products: Single and Double Roll—and Jaw Crushers, Crushing Plants, Reciprocating Plate Feeders and Apron Feeders, Rod Grizzlies, Conveyors, Elevators, Screens, Scrubbers, Steel Log Washers, Sand Drags, Hoists, Jigs, Dry Pans, Dryers, Scrap Bundlers, Pulleys, Gears, Bearings, Sprockets, Sheaves, Rollers, Tin Cutters, Elevator Buckets, Gratings, Car Wheels, Ferrous and Bronze Castings.

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THE GENERAL TRUCK TIRE

SPECIFY GENERAL TIRES ON YOUR NEW EQUIPMENT

tivities and conserve his health. Recently elected to the ACI board were: Elmer D. Hall, president, Three Point Coal Corp.; and Raymond E. Salvati, president, Island Creek Coal Co.

Kanawha Valley Mining Institute, at its annual meeting in Montgomery, W. Va., Jan. 12, elected new officers as follows: president, P. O. Hamer, superintendent, Hatfield-Campbell Coal Co.; vice presidents, Rush Meadows, president, Mary-Martha Coal Co. and Jennys Creek Coal Co.; J. A. Willis Jr., vice president, Coalburg-Kanawha Mining Co.; and W. B. Devaney, comptroller, Cannelton Coal & Coke Co.; treasurer, William Buchanan, cashier, Montgomery National Bank; and secretary, L. M. Morris, consulting mining engineer.

J. D. Jillson, secretary-treasurer of the Anthracite Institute, has been appointed Washington representative for the institute, succeeding E. T. Klett, who resigned to become deputy administrator of the Defense Solid Fuels Administration.

The American Mining Congress has appointed L. C. Campbell chairman of its Coal Division. Mr. Campbell, who is vice president of the Coal Division, Eastern Gas & Fuel Associates, succeeds S. M. Cassidy, president, Consolidation Coal Co. (Ky.), who has been chairman for the past 2 yr. Mr. Cassidy will continue as a member of the Advisory Council of the AMC Coal Division. Other newly appointed members of the Advisory Council are: David Ingle Jr., president, Ingle Coal Co.; K. L. Konnerth, U. S. Steel Co.; James W. Morgan, president, Ayrshire Collieries Corp.; and Arthur F. Peterson, vice president, Bethlehem Steel Co.

Ayrshire Official Joins Defense Administration

G. Don Sullivan, assistant to the president of the Ayrshire Collieries Corp., Indianapolis, last month was named special assistant to Defense Solids Fuels Administrator Charles W. Connor. The appointment was made Jan. 4 by Secretary of the Interior Oscar L. Chapman. At the same time, George P. Wilson Jr., manager of the control section, engineering and construction division of the Koppers Co., was appointed director of the Administration's coke division.

Mr. Sullivan, who has been with the Ayrshire organization since 1939, first became associated with the coal industry in 1935 as executive secretary of the Indiana Coal Merchants' Association. Previously, he had had extensive experience in publishing, personnel and sales promotion work. He is widely known throughout the bituminous coal industry.

For each type of mixture, parts of different alloys . . . . . .

Assure greater wear resistance to each slurry . . . and longer pump life with less maintenance.

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Type R SLURRY PUMP

Naturally, the rate of wear in a solids handling pump is dependent upon the capacity, head and speed. Most pump manufacturers meet these requirements. But Morris gives you something more.

Morris makes its wearing parts in various metals, all differing in composition and hardness. After Morris Engineers analyze your particular slurry, they recommend that metal best suited to your mixture. This assures parts with greater corrosion and abrasion resistance. For example—

One metal used in coal mining installations is Morris Flintmetal "S"—a hard, stainless, high chrome iron, Brinelling between 600 and 700. This metal has greater corrosion and abrasion resistance to slurries containing traces of sulphuric and sulphurous acid.

Other features of the Morris Type R assure longer hours of continuous operation at low cost operation

Easily Dismantled — Impeller and shaft sleeve can be renewed without disturbing the suction and discharge piping.
Gland under suction pressure only — Reduces packing trouble to an absolute minimum. Less leakage, less dilution of mixtures.
Has no internal studs or bolts—This too reduces maintenance trouble and risk of shut-downs.
Shell interchangeable for right or left-hand rotation. Permits 72 different combinations of suction and discharge nozzles.

WRITE US for specifications and operational data on Morris Pumps best suited to your particular needs. Information free.

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MORRIS *Centrifugal Pumps*

JOHNSONITE has found a natural use in mines for a lot of reasons, but its easy installation is one BIG reason why it is being used so extensively.

Flexibility of Johnsonite Plastic Pipe enables it to find its own floor, eliminating cleanup work necessary on mining jobs.

Just feed it down in, and attach it to the pump or pipeline with an adapter having standard pipe threads. The other end of the adapter is an inner sleeve which slips into the pipe.

Stainless steel clamps tighten the pipe down over the sleeve.

It's easy to install also because of its light weight . . . 500 feet of Johnsonite in the ½" size weighs only 50 pounds.

Installation costs are lower than rigid pipe lines.

Johnsonite Plastic Pipe has other features worth looking into: acid and corrosion resistance; economy; 1½ times less friction loss . . . . . our new catalog will give you complete details.

JOHNSON PLASTIC

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CHAGRIN FALLS, OHIO

COAL MEN ON THE JOB

REPPERT COAL CO., Eagle No. 2 mine, Dola, W. Va.: Floyd Alucci (left), superintendent; Paul Swiger, mechanic; George Stonko, maintenance electrician; W. W. Lewis, head welder; Steve Pouroznik, section foreman; and John Barnes, maintenance electrician.

ALSTEAD COAL CO., Gypsy (W. Va.) mine: Charles Scott (left), section foreman; Homer Vance, mechanic; Curtis Reger, night foreman; and Olin Ferris, substation operator.

CLEARCO COAL CO., Clearco, W. Va.: Dennis Bryant (left) and R. R. Baker, mechanics; J. R. Graham, chief electrician; and H. W. Flanagan, mechanic.

COSTANZO COAL MINING CO., Richland mine, Wheeling, W. Va.: Walter Nixon (left), night mine foreman; John Larese and August Mason, section foremen. RIGHT PHOTO—DICK CONSTRUCTION CO., Philippi, W. Va.: Clarence J. Burton (left), drilling foreman, and Hartzel Boyles, pit foreman.

Barber Greene

447106

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for easy assembly and relocation

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(Left) Less assembly time, less "blueprint work"—B-G Mine Conveyors (Channel or Truss Frame) with complete accessories—carriers, take-ups, drives, A-frames, etc.—are designed for maximum interchangeability, greatest ease in selection and erection. Assembly-tested at the factory!

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Even on the toughest piping jobs VICTAULIC Couplings, Victaulic Full-Flow Elbows, Tees and other Fittings will make joining those pipe ends quick, easy and economical—assure you a leak-tight piping job!

You save every way when you join up with "Vic"—a simple two-bolt design gives quick, easy hookups, a standard speed or T-Wrench is the only tool needed for connections... joints are positive-locked, leak-proof, will stand up under extreme pressure, vacuum, or strain conditions.

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NLRB Examiner Rules on UMWA Unfair Labor Charges

Clarification of several of the points under dispute during the 1949-50 wage negotiations was evident in a 50-p interim report covering five cases of unfair labor-practice charges against the UMWA issued Dec. 23 by NLRB Trial Examiner Arthur Leff. His findings, which will stand as a NLRB order if not appealed within 20 days, held that: (1) the UMWA Welfare Fund may not discriminate against non-union employees; (2) the UMWA union-shop clause as it appeared in the 1948 contract is unlawful; and (3) the "able and willing" clause is a legitimate objective of collective bargaining.

In two other cases, the NLRB Dec. 30 found the UMWA and two districts guilty of unfair labor practices in organizing non-union mines in West Virginia and Kentucky and ordered them to cease such practices.

In the earlier decision, the NLRB examiner said that it was unlawful for a union not complying with the Taft-Hartley Act to insist on a union-shop clause in its wage agreement, but he nevertheless recommended dismissal of the refusal-to-bargain charge because the evidence did not show that the UMWA had insisted on this clause in negotiations as a requirement to a contract.

Similarly, he maintained that it was unlawful for a union to demand that welfare payments be made only to union members where a wage agreement doesn't contain a compulsory membership clause, but also recommended dismissal of the unfair charge as it was not proved that the union insisted on such a provision during negotiations.

Under the Act, it was perfectly proper for the union to bargain for an "able and willing" clause, the examiner contended, and he thus recommended dismissal of that charge.

The UMWA's refusal to answer a telegram from the Southern Coal Producers' Association seeking resumption of negotiations also was not a refusal to bargain, the decision pointed out, because previously negotiations had reached an impasse and had not changed at the time the telegram was sent. Dismissal of that charge was recommended.

The UMWA was guilty, however, of unfair labor practices when it insisted that all terms and conditions of the 1948-49 contract be maintained after its expiration if the miners were to continue working until a new agreement was made, the report found. This violation resulted from the fact that that agreement contained the illegal union-shop clause and required payments to the Welfare Fund administered in a manner discriminatory to non-union employees. The union should be required to post notices that such a practice

Eliminate worry over frozen coal supplies

PERMATREAT COAL SPRAY

SPEEDS DE-WATERING . . . PREVENTS FREEZING

This modern oil treatment speeds the de-watering of coal at the mine, keeps it out of the car and stockpile, thus eliminating the cause of freezing in winter.

PERMATREAT Coal Spray is easily applied at the mine after the coal is washed. Sprayed on under pressure, it coats every particle of coal. Water runs off as quickly as though from a duck's back. Melting snow and rain encountered in transit trickle through the load, does not have time to freeze into a solid mass.

Dealers say they seldom have to use shake-outs or other methods to unload cars of oil-treated coal. Industrial users find it speeds up removal of coal to stockpile and eliminates frozen coal stocks that require more time and labor to move.

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You save on maintenance too. The STEELOX joint keeps your building trim and neat year after year. It can't open up or pull apart. No sagging or warping. And of course, the all metal construction is fire-resistant.

Choose Armco STEELOX Buildings for head houses, cap storage, utility buildings and other mining needs. These structures are equally suited for use on permanent or temporary sites. Write for data. Armco Drainage & Metal Products, Inc., 1881 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

ARMCO STEELOX BUILDINGS

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would not again be carried out, the decision recommended.

In the Kentucky organizing case, the board upheld the findings of its trial examiner that the UMWA District 23 had employed a force of 2,000 men in "touring" six non-union mines in June, 1949, and that coercion and restraint had been exercised by the "invasion and seizure" of the mines. The properties involved are operated by the West Kentucky Coal Co., Colonial Coal Mining Co., Homestead Coal Co., Badget Mine Stripping Corp., and the Poplar Ridge Coal Co. While the 3-man panel of NLRB members were unanimous in their decision, one member dissented as to the appropriate remedy, maintaining that the board should order the union to reimburse employees of the coal companies for loss of earnings they may have suffered.

In the West Virginia ruling, the board upheld its trial examiner in finding that District 31 had engaged in "a mass invasion" of the Good Hope mine of the Bitner Fuel Co., when on July 21, 1949, about 450 "adherents" of the district went to the mine to urge operation on 3 days a week only as established in union mines at the time.

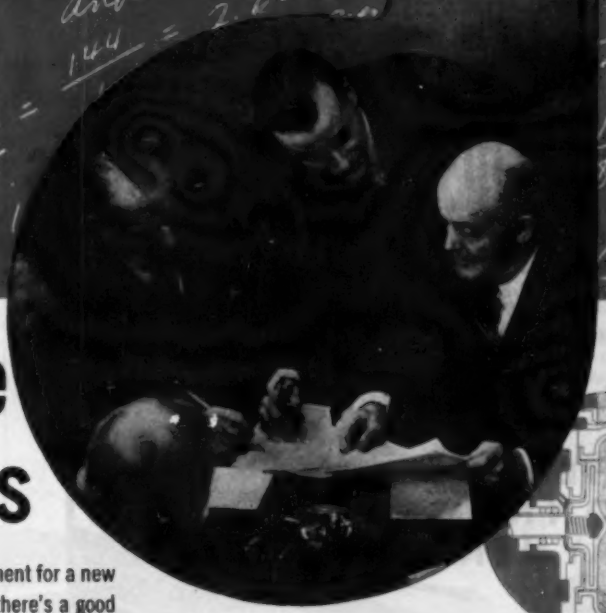
Bituminous Council Adopts Steel and Coal-Car Reports

The National Bituminous Coal Advisory Council Jan. 10 adopted reports covering the coal industry's steel requirements for 1951 and the coalcar problems of the railroad industry, prepared by members of its mining equipment committee and transportation committee, respectively.

More than 1,000,000 tons of steel will be required for the normal mining operations of the anthracite, bituminous and metal industries in 1951, the report said. Bituminous coal mines will require 613,000 tons of the total, it was estimated. The requirements were based on information secured from mining machinery manufacturers and mining companies throughout the country.

In discussing the railroad's position in the present defense situation, a representative of the National Security Resources Board emphatically told the group that the railroads should not think of discarding any more steam locomotives, it was reported. Rather, he emphasized, they should be ready to return a large number of steam locomotives to active use. In the event of war, oil would be one of our critical needs and the military and other uses would undoubtedly require a lot of oil now being used by diesels, he said.

In summarizing its report, the mining equipment committee said: "An adequate supply of steel for the manufacture of mining machines and repair parts and steel for the mainte-



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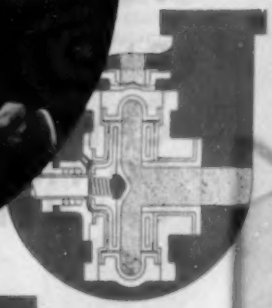
get together to decide on the equipment for a new preparation or beneficiation plant, there's a good chance that they'll agree on the abrasives-handling pumps, at least. That's why you find Hydroseals all over the mining world today, and that's why these pumps are specified on the blueprints of tomorrow. Engineers don't depend on the calculus of probabilities to tell them what abrasives pumps to use. Instead, when they specify Hydroseals, they think in terms of time-proved advantages.



HIGH EFFICIENCY

Clear sealing water protects the close clearances from abrasive wear. Initial high efficiencies are thus maintained throughout pump life.

MINIMUM DILUTION

Dilution from the Hydrosealing water is only a very small fraction of the water handled by Hydroseal Sand and Dredge Pumps; it is infinitesimal even in the largest Hydroseal Slurry Pumps.

LONG LIFE

Many Hydroseals have pumped over a million tons of abrasives without new parts or repairs. Abrasives "bounce off" Maximix Rubber parts.

LOW COST

Hydraulic efficiency reduces power cost by 1/3 to 1/2. Maximix Rubber parts last 4 to 6 times as long as equivalent metal parts.

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HYDROSEAL, PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD

Meeting Modern demands for

better production methods

1 *From mines to washing plant*

2 *After cleaning*

3 *weighing rejects and in*

BLENDING

and in

CHECKING TONNAGE PAYMENTS

Modern Mines use the

WEIGHTOMETER

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All these things a WEIGHTOMETER will do in your cleaning plant add up to LOWER COST PRODUCTION. Leading producers use WEIGHTOMETERS for accurate, speedy WEIGHING WHILE CONVEYING, without interruption to conveyor service. Applicable to existing belt conveyors or furnished complete with short conveyor. Graphs of hourly or daily tonnage, carried continuously or intermittently, produced at your desk if desired. Moving loads of coal weighed and recorded on belt conveyors underground, up a slope, or near the tipple. Write today for Bulletin 375 for further details.

● **AND THERE'S ALSO THE *FEEDOWEIGHT* . . .**

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The FEEDOWEIGHT gives you absolute control in BLENDING and MIXING coal, plus accurate continuous weight totalizing in the same operation. It's just a matter of automatically controlling EACH FEED GATE by WEIGHT without retarding the scale beam. Write today for Catalog No. 351 to find out how one or more of these units can most effectively and economically be used in your cleaning plant.

MERRICK SCALE MFG. CO.

173 Summer St., PASSAIC, NEW JERSEY

nance, repair and operational activities of the bituminous coal mines is essential to the defense program. This is true because of the fact that coal continues to be our principal source of industrial energy and power and is the fuel base on which the iron and steel industry itself is founded. As energy requirements expand in the next few years, coal will be called on to carry an increasingly larger load."

In discussing the need for coal cars in a wartime economy, the transportation committee's report prepared last October made four general recommendations: (1) more efficient utilization of existing equipment; (2) inaugural of a stepped-up program for the repair of present bad-order equipment; (3) maintenance of motive power as essential, with steam locomotives, particularly, kept in repair and no more repairable locomotives scrapped; and (4) the railroads should immediately make contracts to provide the bituminous coal industry with an additional 56,000 cars, with high steel priorities allocated to make this building program possible.

"While slight improvement can be expected from reducing the turnaround time of cars, the railroads do not at this time own sufficient cars to handle present coal production," the committee's report summarized.

Wage and Price Controls Unnecessary, Lewis Says

John L. Lewis, UMWA president, told the Wage Stabilization Board Jan. 10 that price and wage controls were unnecessary and that the Nation's economic stabilization could be secured "in a more normal and efficient fashion through the utilization of the collective bargaining devices built up in the nation through the last 100 yr." Mr. Lewis was the opening witness in a 3-day session at which the board heard representatives of management and labor discuss the establishment of a national wage policy.

After pointing out that our standard of living is now the highest ever, Mr. Lewis continued: "We see no necessity for our country, a democracy, adopting the techniques of the more absolute forms of government. A 25% increase in productive capacity is no task for modern industrial America.

"The coal industry needs no expansion," he continued. "If the country needs another 100 million tons than we produced in 1950, it is available to them. If it needs 200 million tons, it is available—haul it away. The mining industry will produce it without a cent of government money and without issuance of a single fiat or paper regulation. That is free enterprise. That's American aptitude. That's what free men will do."

FIRST LINE OF DEFENSE

America's Great Production Machine—once again the arsenal of democracy—runs on oil and grease. And, among buyers of industrial lubricants, Socony-Vacuum is the *first-choice supplier!* Here's why . . .

Famous Gargoyle lubricants are unsurpassed in quality—constantly improved by Socony-Vacuum research. They are backed by 85 years of lubrication experience . . . are recommended by more machine builders than the products of any other oil company. Performance records, in thousands of plants, prove they help increase production, reduce friction and power losses, lower maintenance costs.

Socony-Vacuum—with more lubrication engineers serving industry than any other oil company—can help improve production performance in *your* plant. Why not give us a call?

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WORLD'S GREATEST LUBRICATION KNOWLEDGE AND ENGINEERING SERVICE

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...for your new, more powerful A-C Tractors

Power...Weight...Balance...

There's one sure way to make these advantages on your new and more powerful Allis-Chalmers Tractor *pay double* on earth-moving jobs.

And that is to specify Baker Bulldozers, Gradebuilders and Root Rippers—for *exclusive* Baker features enable you to use far more of the *tractor power for PUSH.*

Positive down-pressure, for example. Twin hydraulic cylinders exert an equalized *straight-from-the-shoulder* pressure that forces the blade down until virtually the entire weight of the tractor rests on the cutting edge.

And the roll-action of the scientifically designed mold-board moves more dirt on every pass.

Add these to fingertip ease of control, direct lift, easy engine accessibility and short hydraulic linkage with fewer wearing parts and you'll see why Baker is the Buy for your Allis-Chalmers Tractor.

For further information, ask your nearest Baker Allis-Chalmers dealer for a copy of the new catalog, Bulletin No. 894 . . . or write direct to: THE BAKER MANUFACTURING COMPANY Springfield, Illinois.

*Baker—first again—with Engine-Mounted Hydraulic Advantages

P.S.: Baker is the PIONEER and the SPECIALIST in bulldozers

News in Brief

. . . Begins on p 140

Tennessee Coal Demand to Rise

The Tennessee Valley Authority's annual coal requirements will be some 8,000,000 tons higher by 1955 and Tennessee producers will be called on to meet most if not all of this added demand, Dr. George I. Whitlatch, economist for the state planning commission, recently reported. He urged Tennessee coal operators to increase their rate of core drilling and other exploratory work so that local mines would be able to meet the higher fuel demands of the TVA steam-electric generating stations.

Bills Permit Mine Closings

Three bills that would authorize the USBM to close down any coal mine violating safety rules were introduced into the House of Representatives at the opening of the 82nd Congress last month. While their provisions vary, each gives the federal government power to close mines at will, without regard for state mining departments. Two of the measures are identical with those introduced but not acted on by the 81st Congress. The current bills were presented by Rep. Perkins (Ky.), Rep. Price (Ill.) and Rep. Ramsay (W. Va.)

Railroads Ask 6% Freight Hike

The Nation's railroads Jan. 16 petitioned the ICC for a general 6% increase in freight rates as a result of increasing operating costs. The maximum asked on anthracite and bituminous coal would be 18c per net ton or 20c per gross ton, and for lignite coal and briquets 18c a ton. The eastern railroads withdrew their petition for a 4% rise filed in December to join in seeking the larger jump. On Jan. 19 the railroads asked the ICC for authority to put the higher rates in effect immediately, on 1 day's notice, pending the ICC hearing and final decision.

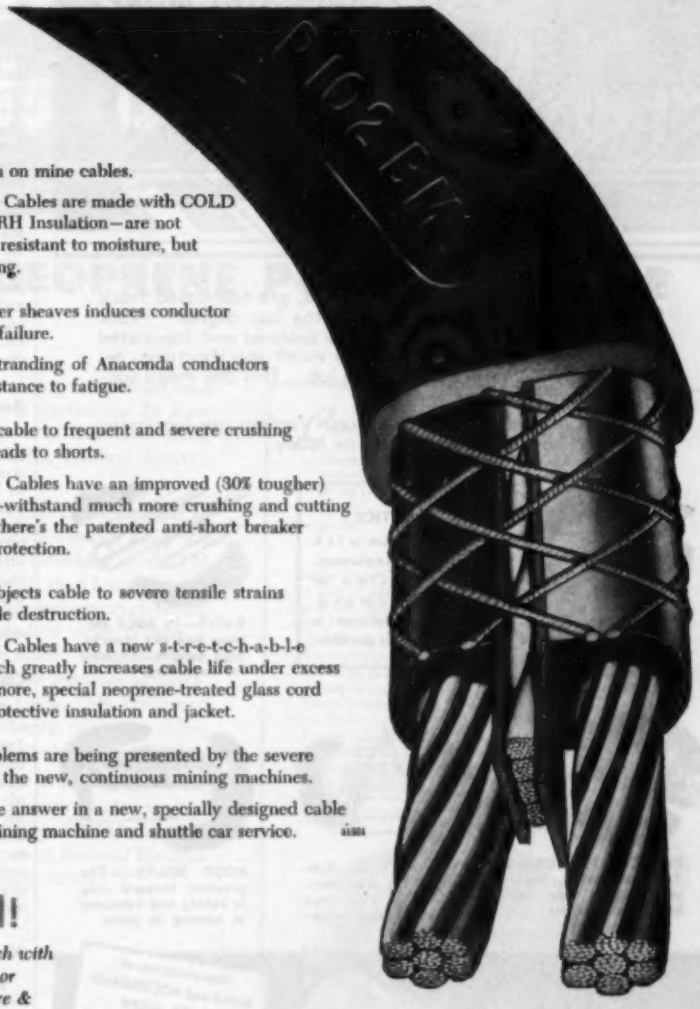
More Shipping for Export Coal

The U. S. Maritime Commission last month allocated 27 Victory ships to 27 U. S. shipping lines on a charter basis for the export of coal and grain. The boats are among the 50 Victory ships previously given basic repairs to prepare them for a return to duty. An additional 20 to 25 ships for export of coal were being sought by the Coal Exporters' Association of the U. S. and other industry representatives. More ships are essential if the 1951 export demands of 15 to 20 million tons of bituminous coal are to be met, it was reported.

Pa. Compensation Rates Down

Revision of Pennsylvania workmen's compensation insurance rates affecting the coal industry is expected to save the industry $332,300

Here's why ANACONDA Shuttle Car Cable is the best you can buy



Problem: Moisture can be tough on mine cables.

Solution: ANACONDA Mine Cables are made with COLD RUBBER Type RH Insulation—are not only much more resistant to moisture, but also to overheating.

Problem: Short-radius action over sheaves induces conductor fatigue, hastens cable failure.

Solution: More effectual stranding of Anaconda conductors means more resistance to fatigue.

Problem: Mine service subjects cable to frequent and severe crushing and cutting action. Leads to shorts.

Solution: ANACONDA Mine Cables have an improved (30% tougher) neoprene jacket—withstand much more crushing and cutting action. Besides, there's the patented anti-short breaker strip for extra protection.

Problem: Mine service often subjects cable to severe tensile strains which can lead to cable destruction.

Solution: ANACONDA Mine Cables have a new s-t-r-e-t-c-h-a-b-l-e ground wire which greatly increases cable life under excess tension. Furthermore, special neoprene-treated glass cord reinforces the protective insulation and jacket.

Problem: Tough new cable problems are being presented by the severe cable requirements of the new, continuous mining machines.

Solution: Anaconda has the answer in a new, specially designed cable for continuous mining machine and shuttle car service.

and that isn't all!

For complete information, get in touch with your nearest Anaconda Sales Office or Anaconda Distributor. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

the right cable for the job ANACONDA®

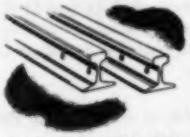
WIRE AND CABLE

When West Virginia pre-planned, pre-fabricated track is used, installation is simplified to the last degree. Track is supplied in easy-to-handle factory planned and fabricated turnouts, curves and rails made to exact specifications, requiring only laying in place on the job. This can mean substantial savings to you.

Find out more about how West Virginia pre-fabricated track can save you money. Write today.

STEEL TIES — Standard designs and weights. Save labor, save height, make good track.

NOTICE
In common with other manufacturers, in view of heavy demand, prompt delivery is not always possible.



RAILS—In ASCE sections and any lengths, high quality rail steel for durability.

SWITCH STANDS—Tops in design, tops in service, tops in quality and variety.

TURNOUTS — Economical in use, economical in cost, easy to install and maintain.

ROOF BOLTS — The greatest forward step in safety and economy in mining in years.

West Virginia Steel & Mfg. Co.
Huntington West Virginia

Manufacturers of
RAILS and ACCESSORIES
TRACK WORK
STEEL TIES

annually, according to an announcement by Artemas C. Leslie, state insurance commissioner. The new schedule, effective Jan 1, reflects an overall reduction of 1.9% for anthracite mining, 10.8% for bituminous and 4.2% for surface mining. The rate for anthracite mining occupational disease was increased by about 10.8% but no change for bituminous was indicated.

Seaway Bill Introduced

Several bills authorizing the construction of the St. Lawrence seaway and power project were introduced into the House of Representatives at the opening of the 82nd Congress. The project, which has been the subject of lengthy Congressional hearings in the past, has long been opposed by coal, union, railroad and other organizations. In his economic message to Congress President Truman called for an immediate start on its construction, stating that it was needed to provide a new source of power for industries in the northeast and to help overcome "a most serious potential shortage" of iron ore for steel-producing plants of the Middle West.

Amherst Safety Record

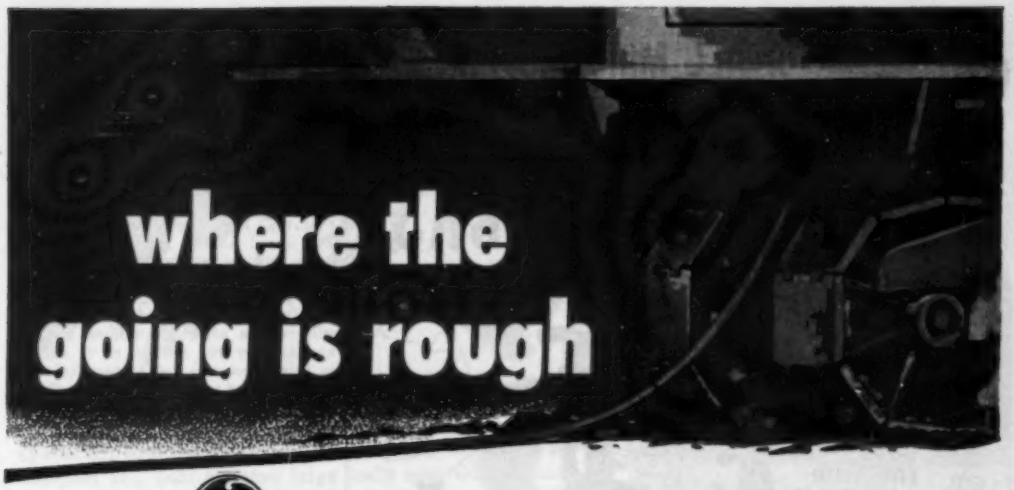
Three of its mines have produced 4,250,000 tons without a fatality, the Amherst Coal Co. recently reported to the Safety Div. of the National Coal Association. Tonnages produced were: Amherst 1-A mine, 1,100,000 tons; 1-B mine, 1,800,000 tons; and 1-C, 1,350,000 tons. The Lundale mine of the Logan County Coal Corp. has mined more than 1,275,000 tons without a fatality, it also was reported.

Consol (Ky.) Safety Awards

Consolidation Coal Co. (Ky.), Div. of Pittsburgh Consolidation Coal Co., Jenkins, Ky., has set up a program under which every operating employee can win a special Christmas award of a turkey or ham. The qualifying period is from Jan. 1 to Nov. 30, 1951, and the plan is especially designed to recognize the good accident records of the individual mines and operating departments and their individual employees.

No Mine Fatalities in Iowa

For the first time in 70 yr of operation, Iowa coal mines in 1950 went through an entire year without a fatality. During the 70 yr of Iowa mining there have been 1,423 mine deaths and in 1949 there were three. While reduced coal mining activity in the state is one factor in the decline, improved safety methods and the "splendid cooperation of the mine operators and the mine workers with the state mining department" also



where the going is rough

USE GE GEOPRENE PORTABLE CABLE

Reel 'em out, reel 'em in—trailing cables must take super-punishment in mining operations. To keep your shovels, loaders, and other machines going full time, get acquainted with General Electric Geoprene portable cable.

Designed to take the treatment handed out in mines—strip or underground—this sturdy cable has greater tensile strength than called for by ASTM standards—more tear resistance than found in ordinary rubber compounds! The resilient construction—durable insulation, double-laid twine reinforcement, and strong Geoprene jacket—gives the kind of toughness you need. Built for continuous operation under heavy current loads, G-E Geoprene portable cable is furnished with one, two, three, or four conductors in a wide range of sizes.

For a big, new, *free* booklet listing all G-E mine cables, write for *General Electric Cables for the Mining Industry*. Address Section W54-214, Construction Materials Department, General Electric Company, Bridgeport 2, Connecticut.

Compare—and be convinced!

These figures, comparing ASTM requirements with typical G-E Geoprene values, indicate at once the superiority of portable cable with Geoprene sheath:

Original	ASTM Requirements	Geoprene Typical Values
Tensile strength, lb/sq in.	1800	3000
Per cent elongation	300	500
Set in 2-in. test piece, in.	3/8	1/16
After 7 days in Geer oven at 70 C.		
Tensile strength, lb/sq in.	1600	2900
Per cent elongation	250	430
After 96 hr in oxygen bomb at 70 C.		
Tensile strength lb/sq in.	1600	2800
Per cent elongation	250	430
After 18 hr in oil at 121 C.		
Per cent depreciation in tensile strength	40	35
Per cent depreciation in elongation	40	35
Tear Test		
Tensile strength, min lb/in.	40*	75

*This is the requirement for rubber jackets; no tear value has yet been set for neoprene-type jackets.

Look to G-E wire and cable for
continuing progress toward
Investigate these famous G-E cables for
better returns in mining operations
Super Coronol® mine power cable
Versotol®-Geoprene cable
Geoprene portable cable
Bore hole cable
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You can put your confidence in—

GENERAL GE ELECTRIC

SAFETY SPEED STAMINA

for ALL Mine Jacking

with

SIMPLEX RATCHET LOWERING JACKS

● These rugged, easy operating Simplex Ratchet Lowering Jacks speed mine jacking . . . and insure greater safety. Proved and used in every type of mine, Simplex Jacks can be depended upon to step up efficiency; to cut time and costs on lifting, lowering, leveling and other jacking jobs.

Every Simplex Ratchet Lowering Jack is built to lift full rated capacity on cap *or* toe. Each guarantees maximum service with these features:

Double lever sockets—Extra strong, adjustable spring mechanism — Shorter Fulcrum centers — Large Trunnion bearings — Reinforced, inner-ribbed housings.

No. 86A — FOR THICK SEAMS
5 Tons capacity — 20" high — 12" lift. For coal cutting and loading machines, rerailing mine cars and light locomotives, shop, track work, etc.

No. 85A — FOR MEDIUM SEAMS
5 Tons capacity — 17" high — 10" lift. For locations where more limited height and lift are required. Combines maximum strength with minimum weight.

No. 84A — FOR THIN SEAMS
5 Tons capacity — Weighs only 28 lbs. — 14" high — 7" lift. For easy handling and operation in cramped quarters.

THE COMPLETE SIMPLEX LINE of MINE JACKS
also includes — Mine Timber Jacks, Post Pullers, Hydraulic Jacks, Geared Jacks, and Anchor Jacks. *Send for Bulletin: Mines 47 and Mines 48*

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SIMPLEX MINE ROOF JACKS
Three Types of Heads

"FS" Flat Swivel for use with wooden pieces — as shown on jack at left.
"C" for square and round timbers.
"PP" for small H beams and rails.

SIMPLEX PIN-UP JACKS
Type "FL" Head — flat with lugs.

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Jacks

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were cited as major reasons by A. Everette Erskine, state mine inspector. Iowa currently has 150 mines employing some 2,000 workers.

Natural Gas Enters New York

Natural gas began flowing from Texas into Manhattan for the first time Jan. 16 as the 1,840-mi pipe line of the Transcontinental Gas Pipe Line Corp. was officially opened. The initial flow of 250 million cu ft daily will be gradually stepped up to 555 million cu ft, with New York City getting about half. Public utilities in New Jersey and Philadelphia will receive some 152 million cu ft and another 100 million cu ft daily is being reserved for transmittal to New England when a pipe line to that area is completed. The natural gas will be mixed with manufactured gas for distribution to New York consumers.

Coal Reserves Total 2,400 Yr

The potentially recoverable coal reserves of the United States total 1.2 trillion tons, equal to a 2,400-yr supply, according to a new appraisal by the U. S. Geological Survey. Of this total, about 30% can be considered as coal of present economic interest, lying in beds 28 in or more thick and under less than 2,000 ft overburden. In making the announcement, Secretary of the Interior Chapman said that coal constitutes nearly 90% of the potentially recoverable fuel reserves of the United States and "despite the relative increase in the use of other fuels during the last 30 yr, coal remains one of the foundations of the national security in its contained reserves of energy."

Seizure Cases Before Court

The U. S. Supreme Court early in January heard oral arguments in two cases in which coal companies are seeking damages as a result of wartime government seizure of the mines. In one case the Court of Claims awarded the Pewee Coal Co. $2,241.26 for the cost of complying with a WLB order to make certain vacation payments during the period of seizure. The other case concerns a Court of Claims award to Wheelock Bros. Although the statute of limitations has expired on all but the 1946 seizure, the government could be held liable for enormous damages in connection with that period of government operation should the Supreme Court uphold the coal companies in these cases. The government's argument that its seizure was merely a "takeover," with only nominal control of the properties, was criticized by the court during the hearing as contrary to its position when it was seeking to avoid application of the Norris-LaGuardia anti-injunction Act. Decisions on the cases are not expected for some time.

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A FRAME OF UNMATCHED STRENGTH

● Hauling equipment used in off-the-highway work must be designed and built to move large loads over difficult haul roads at low cost. It must have rugged "staying power" for the hard usage and varying conditions of mining, construction and quarry operations.

The strong, rigid frame is the backbone of the Rear-Dump Euclid, the hauling unit that has proved its dependable, low cost performance on hundreds of the toughest jobs. Constructed of wide-flanged, deep sectioned "I" beams stiffened by large tubular and box section torque members, the Euclid frame is built to last for the life of the truck. The body is cushioned on large rubber support pads which absorb the heavy impacts of loading and hauling over rough roads . . . there is no metal to metal contact between the body and frame.

Ask your Distributor to show you how all Euclid models, Rear-Dump and Bottom-Dump, are built *throughout* for long lasting, efficient off-the-highway service.

The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO

(1) Heavy steel "I" beams (2) large tubular torque members (3) Box section front torque member (4) Body support pads (5) Rubber-mounted pivot shaft bushings.

EUCLIDS

Clean Your Damp Fines

and clear more dollars

The loading tipple at an Indiana mine is equipped with a Deister Carbon Coal screen, like that above, which cleans damp fines to add $1 or $2 per ton to their market price—with a relatively small investment in equipment.

with a DEISTER Carbon Coal Screen

How can a mine producing around 100 to 150 tons a day increase gross dollar volume with very little expense?

By "taking the dust out of the extreme fines" with a Deister *Carbon Coal Screen.*

Here's what the owner of two mines near Jasper, Indiana, says:

"We run our fines over a Deister Carbon Coal Screen to make ⅝ x ⅛ boiler coal which finds a ready market at $1 or $2 more than raw screenings. In fact, some of these same screenings would not be sold at all except in periods of shortage. This new Deister screen produces from 15 to 35 tons per hour, depending upon the condition of the feed. And it will handle material that entirely clogs up our conventional screen with a ⅜ x 1¼ cloth."

And there's another advantage to Deister Carbon Coal Screens. You can pay as you grow. Add screens as your capacity increases. The head motion is unitized and demountable and interchangeable as a unit and therefore reduces to a minimum the possibility of downtime due to periodic inspection or repair.

These are some of the reasons why you can clean your damp fines and clear more dollars *without an extensive investment* when you install Deister Carbon Coal Screens. For complete information, write for Bulletin No. 52.

This cut-away shows the new Unitized Head-Motion of the Deister Carbon Coal Screen.

DEISTER SCREENS

DEISTER MACHINE COMPANY

FORT WAYNE 4, INDIANA

New Developments

Eastern Gas & Fuel Associates has leased from the Loup Creek Coal Co. the Page mine recently acquired by the Loup organization from the Page Mining Co. The property adjoins the Beards Fork mine, which EG&FA also leases from Loup Creek. The main seam in the Page mine can be mined from the present Beards Fork operation and its addition increases the Beards Fork reserves in the Little Eagle seam from 5½ to 17 million tons. The former 1,100-tpd output of the Page operation is to be raised to about 1,500 tpd. Considerable mining equipment and a store, which is to be operated by the EG&FA stores division, were included in the lease.

Pittsburgh Consolidation Coal Co. is reported to have sold practically all of its remaining coal acreage in Somerset County, Pennsylvania, to the Acosta-Gray Co., headed by Albert M. Swank, of Johnstown, president of Swank Refractories. The properties, totalling 19,787 acres, were sold for $489,035, payable over a 5-yr period. Included in the arrangement were the Gray mine, the Jenners No. 119 and the Acosta No. 121 acreage, and the Acosta No. 120 mine, which had previously been leased to Hiram Swank & Sons.

The entire production of the Baton organization's newly acquired Fayette County, Pennsylvania, mining property will be taken by Shenango Furnace Co. under arrangements recently completed. Actual production has not yet been started and the mine has not been named, to date.

Some 347 acres of coal land, together with the tipple and B & O side track near Dola, W. Va., formerly owned by the Reppert Coal Mining Co., were acquired last month under various leases and agreements by the W. L. Pursglove Coal Co. and Pursglove Coal Service Corp., Clarksburg, W. Va., it was reported. The properties were acquired from the Penn Dola Co., the Reppert Coal Mining Co. and others, with an expenditure of approximately $300,000 involved. In addition, the Pursglove organization was said to have obtained 400 acres of surface land on Little Ten Mile Creek, near Dola, for use in developing a new mine in a 3,800-acre coal tract now under lease from the Ewing interests. Operation of the new mine will be begun as soon as underground mining equipment can be secured, with a monthly output of 15,000 tons expected within the next 6 mos. The property is being planned to produce at a rate of 500,000 tons yearly within 2 yr, it was said.

The Delmont Fuel Co., Greensburg, Pa., last month acquired the Penn Valley Mine of the Penn Valley Mining Co. The property, which is in Westmoreland County, near Hunker,

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Operating temperatures from —40° to +275° F.

For use with hydraulic fluids, lubricating oils, water, air and many other fluids.

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Allow separation and reconnection of fluid-carrying lines without loss of fluids or inclusion of air. 1 coupling takes the place of 2 hand-operated valves.

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Sudden release of braking power on mine locomotives can cause disastrous accidents. The MESCO Hydraulic Brake Adjustor prevents these accidents because it has no threaded parts to rust, strip, or wear. Brake adjustments are quickly and positively made anywhere at any time . . . wherever a grease gun is available. Any quality grease can be used.

The MESCO Hydraulic Brake Adjustor is easy to install and is adaptable to most mine locomotives. It is available in any length from 10" rod centers up and can be furnished with tubular grease extension for closed type frames. Play it safe . . . investigate the MESCO Hydraulic Brake Adjustor today.

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"A COMPLETE LINE OF RAIL BONDS AND OTHER TRACK AND TROLLEY PRODUCTS FOR THE MINING INDUSTRY"

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1. CONTINUOUS MOVEMENT of cars fully controlled, but without costly delays.
2. EASE OF INSTALLATION and moving.
3. POSITIVE PROTECTION against abusive overloads.
4. SIMPLICITY of working parts.
5. ELECTRICAL EQUIPMENT interchangeable with other mining machinery.
6. POWER UNIT LOCATED always out of the way.

THE W. R. STAMLER CO.
33 Fifteenth Street Paris, Kentucky

is adjacent to the purchasing company's Delmont No. 10 mine.

The Bethlehem Steel Corp. Jan. 5 announced the purchase of the Maryland-Century Coal Co., near Century, Barbour County, W. Va. Bethlehem had been buying the Maryland-Century output for several years and will now take over operation, it was said.

The Peabody Coal Co. has contracted with the shaft and tunnel department of the Contracting Div. of the Dravo Corp. for the construction of a new air shaft and slope at its Mine No. 10, near Sicily, Ill. The concrete-lined air shaft will be 15 ft in diameter and 350 ft deep. The 8x18-ft. slope, also concrete-lined, will be 300 ft. long.

The Lorado Coal Mining Co., Lorado, W. Va., is presently making an exploratory underground opening in the Stockton seam about 800 ft above its No. 2 mine. If successful, the opening, which is known as Lorado No. 7, will make available some 3 to 4 million tons of reserves minable by present mining methods. Coal is carried down the present rope-and-button conveyor to the No. 2 preparation plant.

Bevins & Chaney Coal Co., Mouthcard, Ky., has changed its name to Elkfoot Mines, Inc., and is reportedly opening its new Elkfoot No. 2 drift mine at Conway, Buchanan County, Va. The property will have a daily capacity of 800 tons from the Hagy seam and will ship via the N. & W. Some 4,000,000 tons of reserves are available for development.

Foreign Developments

British Miners Pledge Higher Output in Fuel Crisis

LONDON—The 27-man executive board of the British mine union Jan. 3 pledged support of the government's appeal for an additional 3,000,000 tons of coal to be mined by the end of April. Support of the government's program was given by the mine leaders at a meeting called by Prime Minister Attlee and attended by several cabinet ministers.

Mr. Attlee's appeal came as bad weather and increasing power demands indicated the possibility of a serious fuel shortage. Coal stocks at the first of the year were down to about 14,000,000 tons and a further drop to 7,000,000 by March, with a

Coal Washing

The NEW MODEL K WILFLEY SAND PUMP

WILFLEY centrifugal PUMPS

Companion to famous WILFLEY Acid Pumps

World famous WILFLEY Sand Pumps are ideally suited to heavy media circuit and thickener circuit work in coal washing operations. They deliver trouble-free performance at low cost without media loss, leakage or dilution.

Investigate the new Model K Centrifugal Sand Pump which offers many important mechanical improvements and gives you even greater dollar savings—in power and production. This rugged, new heavy-duty pump delivers stepped-up performance and dependable service. There is an efficient, economical pump size for every requirement. Individual engineering on every application. Write or wire for Bulletin 200 on the new Model K.

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MORE HAULAGE FOR 20% LESS BATTERY CAPACITY

Double knee-action; better trackability. Floating power; less power consumption. Quick acting footbrake—essential for quick stopping, especially behind loading machines. Brake shoes (hollow wheels (due to knee-action). Adjustable Timken Bearings throughout.

Rugged transmission in any storage battery locomotive. Oil-tight; leakproof. Use regular auto oil; change every 6 months. Strong. Simple design. Low maintenance cost. Backed by over 25 years of experience with Storage Battery locomotives.

GREENSBURG "MONITOR"

Franklin County Coal Corporation at Royalton and Herrin, Illinois, have 12 of our Monitor type, storage battery locomotives.

All Greensburg Locomotives are CUSTOM-BUILT to your requirements

THE GREENSBURG MACHINE CO. 101 STANTON ST GREENSBURG, PA.

consequent closing of factories and industrial plants, was considered a possibility.

British coal production totalled 216,301,000 tons in 1950, it was estimated. While 1950 output was 1,200,000 tons above that of 1949, it still was 1,700,000 tons below the government's minimum target for the year. The first U. S. coal imported to meet the current crisis reportedly arrived Jan. 2 and some 60,000 tons was enroute at that time. The government has chartered 100 shiploads and expects to import up to 1,200,000 tons from the U. S.

Later on Jan. 17, the union representatives announced that they had agreed to the government's importation of 10,000 Italian miners with experience in Belgian mines. They also agreed to try to cut the 1950 absenteeism rate of over 11%. In return, the Coal Board approved an immediate 5% pay rise for 400,000 miners in the lower levels, contributed £2,000,000 to the pension fund and agreed in principle to a second week's vacation for all miners when production permits.

Canadian Miners Get Increase

CANADA—An 80c-a-day wage increase across the board has been won by coal miners in Alberta and eastern British Columbia, following negotiations between District 18, UMWA, and domestic and bituminous operators.

The agreements between the union and Western Canadian Bituminous Coal Operators' and Domestic Coal Operators' associations are effective for one year, starting Feb. 17. New wage rates call for from $10.95 to $11.74 a day in the bituminous fields and $10.59 to $11.54 in the domestic fields.

HOLLAND—The Dutch government is planning the purchase of 200,000 tons of American coal to prevent a possible slow-down of Dutch industries, it was reported early last month. Since the coal cannot be paid for with Marshall Plan dollars, the government hopes to save free dollars by transporting the coal in Dutch ships.

RHODESIA, SOUTH AFRICA—A high-quality coal seam ranging from 10 to 37 ft thick has been discovered as a result of drilling over a wide area around Lubimbi, about 140 mi north of Bulawayo, according to a director of Anglo-Colonial Territories, Ltd.

GREECE—The government of Greece has signed a long-term contract with Pierce Management, Inc., Scranton, Pa., for the design, erection, procurement and management of two lignite mines at Aliveri, Greece. Members of the Pierce organization who left for Greece in mid-November for a 30-day inspection tour included James H. Pierce, Calvin J. Adams, Keith W. Robbins, Henry J. Evans and M. M. Haley.

SILENTLY, but ruthlessly *(even as you are reading this)* rust is gnawing away at tipples, sheet metal, bins, machinery, conveyors, mine cars, underground structural steel and piping — every rustable metal inside and outdoors.

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RUST-OLEUM stops rust! Its tough, pliable, rust-resisting film gives excellent protection that prevents rust losses under many difficult rust-producing conditions.

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"Rigid Economy, Men!"

RUST-OLEUM

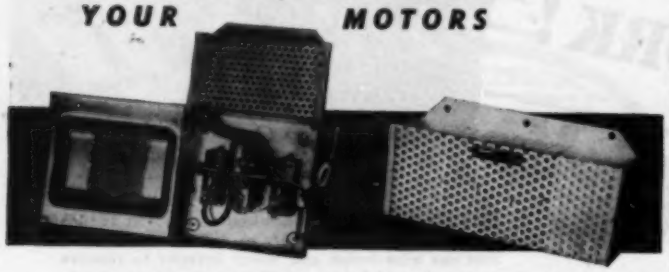
Stops Rust

Beauti... AS IT ...

Available in many **COLORS**, aluminum and white.

SMOOTH STARTS with GUYAN

D. C. STARTERS MEANS LONGER TROUBLE-FREE SERVICE FROM YOUR MOTORS



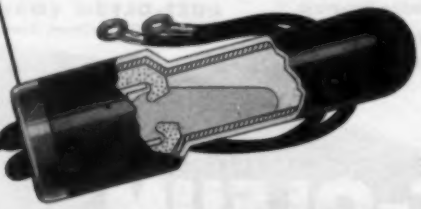
GUYAN TYPE MMS MOTOR STARTER
Manually operated — automatically makes armature-to-line connection at proper speed to insure smooth starts after power disruptions. Solderless lug connections.

GUYAN TYPE CMS MOTOR STARTER
Limits initial inrush of current—permits smooth starts—prevents arcing. Requires no operator. Similar to type MMS except for omission of manually operated starting switch.

Write for bulletins

GUYAN MACHINERY CO. LOGAN, W. VA.

10 YEAR SWITCH



TROUBLE-FREE

for the Life of Your Product

- ★ Seven new models—1 to 65 amperes
- ★ Millions of contacts assured
- ★ Smaller in size—increased in capacity
- ★ Positive "Make and Break" contact action
- ★ No deterioration from inactivity
- ★ Moisture proof if desired
- ★ Withstands high temperatures

Send for BULLETIN 525

Steel Durakool MERCURY SWITCHES

See Telephone Directory for Local Distributor or Write DURAKOOL, INC., ELKHART, INDIANA

New Books for Coal Men

Making Fuel Gas From Coal

Economics of Fuel Gas From Coal, Battelle Memorial Institute, J. F. Foster and R. J. Lund, editors, for Bituminous Coal Research, Inc. What progress has been made in gasification of coal? What advances in equipment and methods are possible? What are the costs and how do they affect coal's competitive position? Battelle Memorial Institute, at the request of the Technical Advisory Committee of BCR, has compiled data that will help answer these questions and others. Part I deals with technical aspects of fuel-gas production, together with economics and costs of investment, maintenance and operating. Part II deals with transportation costs of various fuels, supplies, demand and prices. *McGraw-Hill Book Co., Inc., 330 West 42d St., New York 18. 289 pp. 6¼x9¼-in; cloth. $5.*

Managing Wages and Salaries

The AMA Handbook of Wage and Salary Administration, edited by M. J. Dooher and Vivienne Marquis. Believing that many companies will reexamine their wage and salary policies in anticipation of wage controls, American Management Association has compiled this volume of information on wage surveys, union contracts covering office salaries, job-evaluation forms and other data. Broad information makes the book adaptable to large and small companies. Case histories are cited. *American Management Association, 330 West 42d St., New York 18. 416 pp. 6¼x9¼-in; cloth. $7.50.*

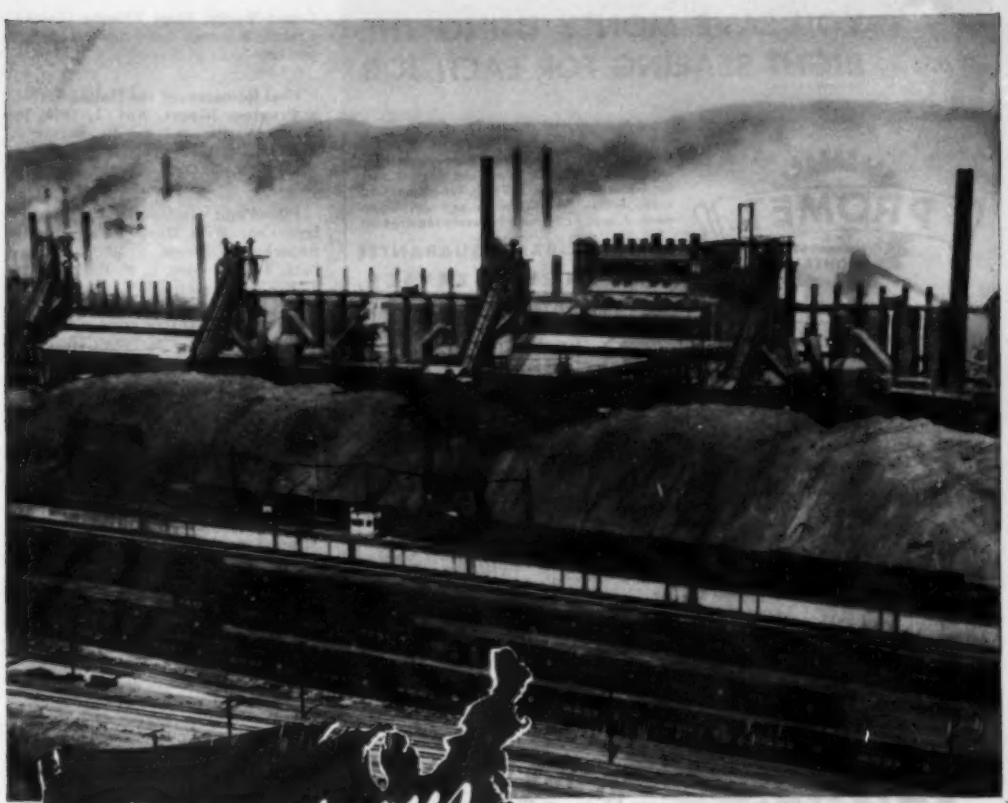
How to Make Safety Talks

Speaking of Safety—Six Training Films with a Leader's Manual, edited by Irving J. Lee. If your foremen and supervisors need training in addressing and conducting safety meetings, these films may help. Film titles are: "The Power of Speech," "Butterflies in Your Stomach," "The Key to Good Speaking," "On Your Feet," "Now You're Talking" and "Ring the Bell." Each film requires 13 min. Films are standard 35 mm soundslide, with 16-in 33⅓-rpm records. *National Safety Council, 425 N. Michigan Ave., Chicago 11. Price to members: $100 per set, $18 per single film; to nonmembers, $200 and $36.*

Other Books and Booklets

Labor Relations Work Kit, edited by Lawrence Stessin. Tested Techniques for the labor-relations and personnel director. National Foremen's Institute, New London, Conn. 200 pp. $7.50.

Proceedings: International Conference on Coal Preparation, Paris, 1949. English-language edition of 60 papers. Secretariat de la Societe de l'Industrie Minerale, 19 Rue du



Bituminous

to the power of America

The bituminous coal industry
has the strength—the know-how—
to meet *any* challenge.

Only with indispensable bituminous
can the greatness of America be maintained.

For excellent bituminous coals
to meet your every need,
Ask our man!

BALTIMORE & OHIO RAILROAD

Constantly *doing things* — better!

LINKING 13 GREAT STATES WITH THE NATION — B&O

YOU SAVE MONEY USING THE *RIGHT* BEARING FOR EACH JOB

PROMET — THE Engineered BRONZE

Cut your bearing costs with Promet axle bearings, journal liners, bushings and wearing parts for General Electric, Sullivan, Goodman, Oldroyd, Jeffrey, Westinghouse and Joy equipment. A specific formula for every requirement.

A MONEY-BACK GUARANTEE OF LONGER SERVICE, LOWER MAINTENANCE COST

PROMET BRONZE BAR STOCK

Round, solid, tubular. Rough cast or fully machined. Cored stock, all sizes (by ½" steps) from ½" minimum core to 26" O.D. and 13" lengths or less. 6 grades of hardness.

PROMET LEAD OR TIN BASE BABBITT

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Prompt deliveries. Stocks maintained at

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CRACK COAL REDUCTION COSTS !

With an Eagle Coal Cracker

Turns Out 20 to 50 Tons Per Hour (Depending on firmness and lump size) Will Handle Mine Run Lumps 8" to 10"

"Preparation plant on wheels" is what one strip mine operator calls his Eagle Portable Packaged Unit Coal Cracker. Reduces coal to wanted sizes at low cost per ton. Two gearings permit reduction of ⅜" to 1⅜" or 1⅜" to 2¾". Ready means of adjusting rolls spacing for desired reduction sizing. Safety springs on rolls adjustment protect against tramp iron. Semi-steel or alloy carbon steel toothed crusher rolls afford low maintenance. Rugged, self aligning bearings. Large feed hopper. Many in use in most fields. Ask for Bulletin 649—also describes stationary models and smaller Eagle Coal Chippers.

SINCE 1872 Progress Service

Olson Self-Dumping Mine Cages and Stoker Coal Crushers

EAGLE IRON WORKS

181 Holcomb Ave., Des Moines, Iowa

Grand-Moulin, Saint Etienne (Loire), France. 6 issues. 3,000 francs ($8.70) per set.

Coal Resources of the United States, a Progress Report, Nov. 1, 1950, by Paul Averitt and L. R. Berryhill. U.S.G.S. Circular 95. Free, U. S. Geological Survey, Washington 25, D. C.

Pilot-Plant Gasification of Pulverized Coal With Oxygen and Highly Superheated Steam, by G. R. Strimbeck, J. H. Holden, L. P. Rockenback, J. B. Cordiner Jr. and L. D. Schmidt. U.S.B.M., R.I. 4733. 41 pp. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.

Preparation Characteristics of Coal Occurring in Cambria County, Pa., by W. L. Crentz and Fern Steele. U.S. B.M., R.I. 4747. 47 pp. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.

Centrifugal Pump Installations in Anthracite Mines of Pennsylvania, by W. H. Lesser. U.S.B.M., R.I. 4749. 22 pp. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.

Effect of High Pressures on the Explosibility of Mixtures of Ethane, Air and Carbon Dioxide; and Ethane, Air and Nitrogen, by R. E. Kennedy, I. Spolan, W. K. Mock and G. S. Scott. U.S.B.M., R.I. 4751. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.

Among the Manufacturers

. . . Begins on p 148

Trenton, N. J. Associated with Roebling for the past 9 yr, Mr. Maloney has served as assistant manager since 1949. Frank T. Craven, a member of the electrical staff since 1936, has been appointed assistant manager of sales. Roy H. Hainsworth has been made Eastern regional manager, with headquarters in Trenton. He joined the Roebling sales force in 1947 and has served in both Denver and Chicago districts.

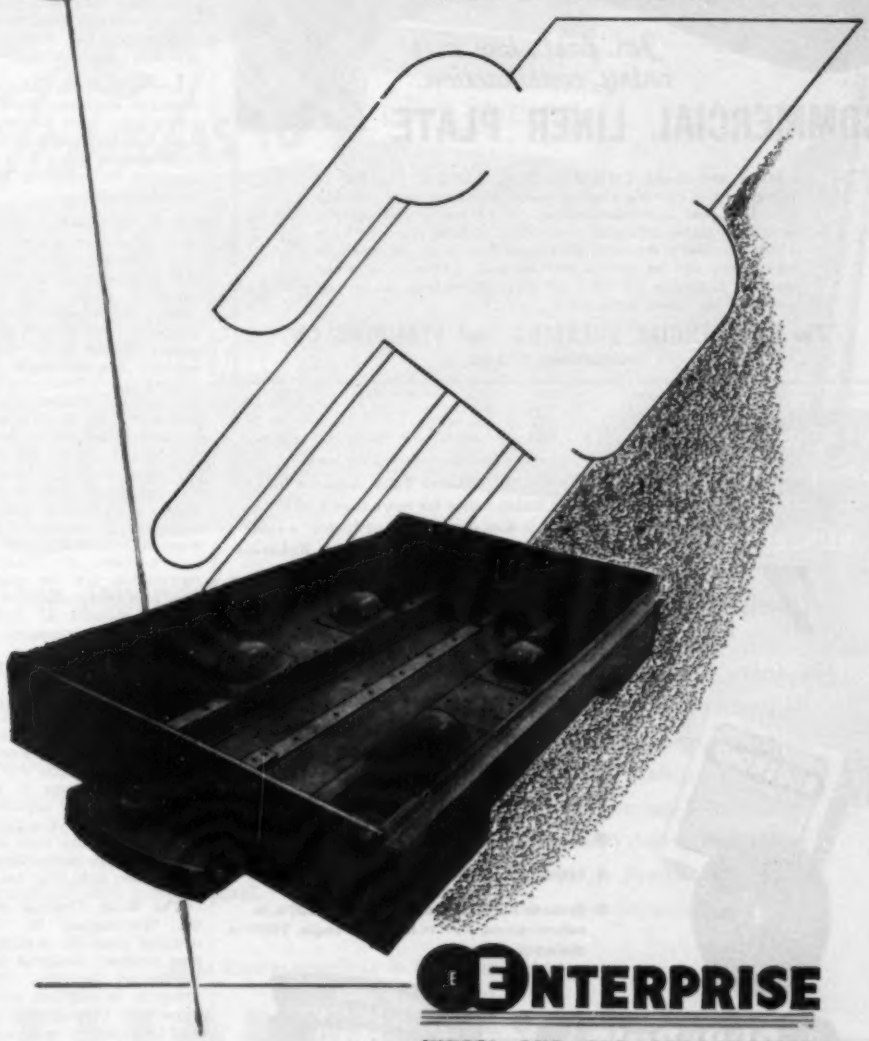
Robert J. Russell has been named sales manager, Hardinge Co., Inc., York, Pa. Mr. Russell, also secretary of the company, was formerly chief of the technical staff. He joined Hardinge in 1929 as a service engineer and became secretary and technical staff chief in 1948.

J. J. Carlson, assistant general sales manager, Kaiser Steel Corp., has been promoted to the post of general sales manager. Joining Kaiser Steel in 1944 after several years with Inland Steel Co., Mr. Carlson has served in several sales capacities, becoming assistant general sales manager last March.

L. A. Watts has been named assistent general sales manager, Wickwire Spencer Steel Div., The Colorado

52 YEARS

OF CUSTOM-ENGINEERED MINE CARS . . .



ENTERPRISE

WHEEL AND CAR CORPORATION
BRISTOL, VIRGINIA - TENNESSEE
HUNTINGTON, WEST VIRGINIA

For fast, low cost entry construction

COMMERCIAL LINER PLATE

• More and more COMMERCIAL LINER PLATE is being used in driving entries. Steel liners not only provide safe, low cost construction but can be easily and quickly installed—water inflow is controlled and experienced help is not necessary. Another advantage from the cost angle is that plates can be moved and re-used. Commercial liner plate is available to meet all sizes of entries under all kinds of operating conditions.

***The* COMMERCIAL SHEARING *and* STAMPING CO.**
YOUNGSTOWN 1, OHIO

SAVE ON CABLE MAINTENANCE WITH RUBEROID'S **7** BIG COST-CUTTING FEATURES

You are assured of a longer, more economical life for your cable with Ruberoid Insulating Tape. A leader in cable maintenance for more than half a century, it does more than just "patch" a cable splice. Equally adhesive on both sides, Ruberoid Insulating Tape strengthens your cable with such vise-like power that you can drag your cable anywhere with complete safety. And only Ruberoid gives you all seven of these money-saving features!

- Double grip . . . both sides adhesive
- Great tensile strength . . . tough
- Won't tear, ravel or pucker
- Resists abrasion
- Acid and alkali-proof
- Extra thick . . . one layer insulates
- Exceeds A.S.T.M. specifications by 300% in adhesiveness, 26% in tensile strength, 290% in dielectric strength.

The RUBEROID Co.
EXECUTIVE OFFICES: 500 Fifth Avenue • New York 18, N.Y.

MORE YEARS FOR YOUR DOLLAR WITH RUBEROID BUILDING MATERIALS

Fuel & Iron Corp., New York. Mr. Watts joined the Wickwire Spencer Steel Co. as a chemist in the Buffalo plant in 1938 and since that date has held various positions. Robert M. Wagner, formerly assistant sales manager in the department, has been named sales manager of the wire-products department, to succeed Mr. Watts.

Roland E. Govan has been appointed sales promotion manager of the Falk Corp., a newly created position in which he will supervise the sales promotion and advertising departments. Associated with the company since 1934, Mr. Govan has served as a special representative in the sales division and has had charge of new-products investigation.

Lester E. Robb has been appointed chemical engineer, Rockbestos Products Corp., New Haven, Conn. Mr. Robb formerly was associated with the Polychemical Div., E. I. du Pont de Nemours, Wilmington, Del., as a chemical engineer.

H. C. Coleman has been named manager, industry-engineering department, Westinghouse Electric Corp., with headquarters at the East Pittsburgh divisions. Mr. Coleman succeeds F. R. Benedict, who was recently assigned new duties with the company's Atomic Power Div. S. A. Haverstick has succeeded Mr. Coleman as manager of the marine and aviation section, industry-engineering departments. A. M. Harrison has been appointed manager of the dc engineering department of the Westinghouse Transportation and Generator Div., E. Pittsburgh, succeeding Clarence Lynn, who has recently undertaken engineering responsibilities at the company's Atomic Power Div. In his new position, Mr. Harrison will be responsible for the engineering design and development of all medium- and large-sized dc generators and motors for the company.

Trabon Engineering Corp., Cleveland, has appointed the Ritter Engineering Co., Pittsburgh, Pa., exclusive distributor in the Pittsburgh district to handle design, sales, installation and servicing of Trabon centralized-lubrication systems on all types of machinery. Wayne G. Ritter, president of the newly appointed company, is a graduate of the Colorado School of Mines and has been employed as a sales engineer with several industrial companies, including Trabon.

The West Virginia Steel & Mfg. Co., Huntington, W. Va., has announced plans for a $2,250,000 expansion program designed to increase its production facilities. The new program is in addition to the $750,000 expansion started some months ago and is expected to be completed late this year or by early 1952. Construction will include a new building to house a blooming mill and two 30-ton electric furnaces and four smaller

Reliance Precision-Built, Totally-enclosed, Fan-cooled A-c. Motor.
Twin Apron Feeders, operated by 10 hp. Reliance Motors at the new Indiana mines of Snow Hill Coal Corp.
Weigh Pan Gate operated by 15 hp. Reliance Motor at new Snow Hill mine.
THE Trend IS TO
Precision-Built

.... for dependable, economical power above ground!

Fan-cooled Reliance *Precision-Built* Motors are found on more and more dirty jobs above ground. Here's a trend that means operators everywhere are realizing in these rugged, long-lived motors the same dependability and economy which have made Reliance Motors the Number One choice for the toughest jobs underground.

In the operation of equipment such as apron feeders, weigh pan gates, shaking and vibrating screens, washers, pumps, air tables, crushers and conveyors... Reliance *Precision-Built* Motors can offer you real help in keeping production up, costs down. Write today for Bulletin B-2101 on *Precision-Built* A-c. Motors from ¼ to 300 horsepower.

Sales Representatives in Principal Cities

RELIANCE ELECTRIC AND ENGINEERING CO.

WITH A

Flood City

CAR SPOTTING HOIST

The Flood City Car Spotting Hoist features a quiet, self-oiling worm gear reducer rated at 6000# rope pull at 35 ft./min. INHERENTLY NON-REVERSIBLE DRIVE holds drum stationary when motor is stopped. ANY STD. MAKE OF MOTOR IS USABLE. Sturdy jaw clutch frees the drum for coupling the trip.

SPECIFICATIONS: Length, 7'; Width, 29½"; Height, 30½"; Weight, 2185 lbs.; Rope Capacity, 500 ft.—⅝", 750 ft.—½". Channel iron frame with solid steel bottom . . . completely guarded . . . all parts readily accessible.

FLOOD CITY BRASS & ELECTRIC CO.

JOHNSTOWN, PA. • BRANCH OFFICE: CHARLESTON, W. VA.

Hendrick PERFORATED METAL PLATE

on a gyrating screen

This popular heavy-duty scalping unit is equipped with a 5' x 14' Hendrick metal plate with square perforations.

Hendrick Perforated Plate can be supplied, either flat or corrugated, with any desired shape and size of perforation, in tank, high carbon, high tensile, and abrasion-resisting steels, and in other commercially rolled metals.

It maintains uniformity of mesh throughout an unusually long service life. Its full clearance obviates clogging, and the ease with which decks can be changed minimizes labor costs. Write for detailed information.

SEE OUR CATALOG IN SWEET'S

HENDRICK

Manufacturing Company

41 DUNDAFF STREET, CARBONDALE, PENNA.

Sales Offices In Principal Cities

Perforated Metals
Perforated Metal Screens
Wedge-Slot Screens
Mitco Open Steel Flooring
"Shur-Site" Treads and Armorgrids

buildings. A major part of the increased steel output will go into mine roof bolts and fabricated mine track, it was reported.

Joseph T. Ryerson & Son, Inc., has moved into its new and larger steel-service plant and office building in Cincinnati, begun early last year. Located at 3475 Spring Grove Ave., practically in the center of the Cincinnati industrial area, the new plant represents an investment of over $1,000,000 and provides 165,000 sq ft of floor space. Designed for maximum utility in handling and processing steel shipments and offering complete cutting facilities for preparing steel to customers' requirements, the new plant is one of 13 service plants maintained by Ryerson throughout the country.

Atlas Chain & Mfg. Co., Philadelphia, has appointed D. A. Paisley a technical sales representative, with headquarters in its Chicago office.

Hose Accessories Co., Philadelphia, has announced the appointment of two new factory representatives. Almon O. Snyder, 8001 Carnegie Ave., Cleveland, will cover Ohio, Pennsylvania, West Virginia, Kentucky and southern Indiana. Arthur W. Gadd, 1805 Grand Ave., Kansas City, Mo., will represent the company in the states of Missouri, Kansas, southern Illinois, western Iowa and Nebraska.

Rapidly mounting demand for electric motors and controls necessitates a further expansion in manufacturing facilities by The Reliance Electric & Engineering Co., J. W. Corey, president, recently reported in announcing plans for another plant in the Cleveland area. To cost in excess of $1,500,000, the project involves construction of a one-story building of 130,000 sq ft on a 60-acre plot acquired in Euclid. In addition to offering increased manufacturing facilities, the new plant will house the company's engineering, development, research, and renewal parts departments.

Several changes in sales personnel also have been announced. R. C. Suttle, sales engineer in the Cincinnati office for the past 2 yr, has been made manager of a new branch sales office established in El Dorado, Ark. W. C. McConnell, who has been directing sales at the Reliance office recently opened in Charleston, W. Va., has become sales engineer in Detroit. C. V. Harp Jr., transferred from Houston, replaced Mr. McConnell at Charleston, and R. I. Coryell Jr., sales engineer at Syracuse, replaces Mr. Suttle in Cincinnati. Establishment of Reliance Electric & Engineering (Canada) Ltd., Welland, Ont., as successor to the Commonwealth Electric Corp., Ltd., acquired by Reliance last September, also has been reported. Transformers and ac motors will continue to be manufactured and sold under the name Commonwealth and the plant also is taking on the manufacture of three Reliance lines.

MORE MILES OF MOTION

Homocord CONVEYOR

Round and round—up and down they go, taking the hard impact of heavy loading . . . and still coming back for more . . .

Users tell us there are more ton-miles of rugged service in Homocord Conveyor Belts than in any other. This is not accidental; we engineered Homocord specially for heavy duty conveying. It cushions load-impact. It troughs naturally, needs less training. It's flexible, yet it's strong.

Bulletin 6906, mailed on request, presents convincing proof.

Our hose, V-belts and flat belts, too, are engineered for extra long life. Ask your R/M Representative.

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose • Fan Belts • Brake Linings • Brake Blocks • Clutch Facings • Packings Asbestos Textiles • Powdered Metal Products • Abrasive & Diamond Wheels • Bowling Balls

PICK YOUR POWER with

The NEW Acker Teredo Drill...

No temperamental prima-donna is Acker's new, versatile Teredo Core Drill—*it performs efficiently with any power plant.*

And for dependable, low-cost, trouble free operation anywhere in the world—Acker design and construction can't be beat.

See for yourself—write for Bulletin 33.

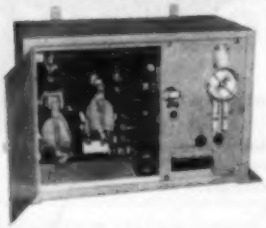
Over 30 years' experience in the design and development of Drilling Equipment.

ACKER DRILL CO., INC.
SCRANTON 3, PA.

RUGGED...for mine service

ENSIGN-CLARK STARTER

With Westinghouse De-ion Circuit Breaker



Photograph illustrates 10 H. P. Bulletin 5390 starter. 230-volt D. C. manual reversing with circuit breaker disconnect.

ONLY ENSIGN-CLARK features Clark Varitime contactors as standard equipment. Other standard features include Clark overload relay, Edgewound resistors, built-in start-stop push button, Westinghouse de-ion circuit breaker for short circuit protection.

PLUS THESE OPTIONAL FEATURES: Three-wire control, field rheostat, 3, 5 or 6 pole motor cable disconnect plug, skid mounting.

HEAVY STEEL ENCLOSURE. All parts accessible for inspection and repair. Reversing switch interlocked to prevent plugging.

914 Adams Avenue — ENSIGN — Huntington 4, W. Va.

A $1,500,000 expansion of plant and manufacturing facilities for the Quaker Rubber Corp., Philadelphia, a division of H. K. Porter Co., Inc., was announced last month by T. M. Evans, president. The expansion plan, which will be activated immediately, will increase the finished rubber-products capacity of the plant by 30%. Centered around a new compounding and mixing building, the program includes a new administration building and a new $300,000 72-in double-deck conveyor-belt press. Approximately 70% of the expenditure is earmarked for new equipment, with the remainder going into new buildings.

The Westinghouse Electric Corp. will build a new plant for the production of small electric motors in Union City, Ind., it was recently announced by C. C. Shutt, manager of the Westinghouse Small Motor Div. The new plant will be a modern one-story structure containing both manufacturing and office space and when in full operation will employ approximately 500. Production is expected to start late in 1951. Mr. Shutt also recently announced plans for additional expansion of the Westinghouse Small Motor Div. in Lima. Two buildings, totaling some 120,000 sq ft of floor space, have been leased. The larger building will be used to produce machined parts needed at the company's main Lima plant for military production, with the second building devoted to office and storage use.

The Howe Scale Co., Rutland, Vt., has announced the opening of two new branch offices. The Denver office is located at 2524 Walnut St., and is managed by Daniel O. Ferris. The Houston office is located at 2215 McKinney Ave. and is managed by Henry K. Leonard. With the addition of these branches, the Howe organization now maintains 20 branch offices offering complete sales, service and warehouse facilities in leading U. S. cities.

Following a policy of diversification of its manufacturing operations, H. K. Porter Co., Inc., Pittsburgh, Pa., has acquired the Delta Star Electric Co., Chicago, manufacturers of high-voltage electrical equipment, T. M. Evans, president, recently announced. No change in the operations or management of the Delta company is contemplated.

Purchase of a site for the erection of another link in its chain of plants throughout the country for the manufacture of oxygen and nitrogen, has been announced by Air Reduction Sales Co., a division of Air Reduction Co., Inc., New York. The new plant and facilities will occupy a 23-acre tract of land in Butler, Pa., and is expected to be in operation the latter part of 1951.

Connors Steel Co. Div., H. K. Porter Co., Inc., is proceeding immediately

PROX

ing Chain

eliminate costly Breakdowns and Replacements

TONS PER MAN-DAY DEPEND UPON CONSISTENT OPERATION AT THE FACE. EQUIPMENT BREAKDOWNS HERE CAN BE COSTLY FAR BEYOND THE PRICE OF A NEW MACHINE OR OF NEW CUTTING BITS.

TOOL STEEL BIT

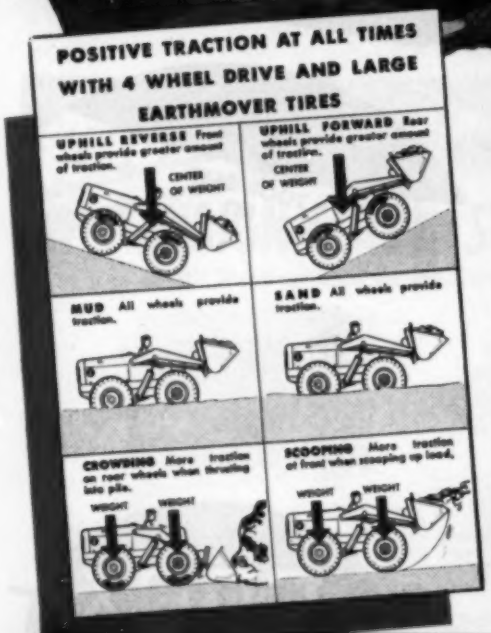
THE PROX TOOL STEEL BIT HAS BEEN DESIGNED AND ENGINEERED TO PROVIDE A MAXIMUM OF HARD CUTTING WITH A MINIMUM OF DOWN-TIME DUE TO BIT FAILURE.

LET PROX INVESTIGATE YOUR CUTTING PROBLEMS AND SHOW YOU HOW TO SAVE THOSE LOST TONS OF PRODUCTION AS WELL AS TIME AND MONEY.

PROX

ON THE BANKS OF THE WABASH

4 Wheel Drive PAYLOADER


POSITIVE TRACTION AT ALL TIMES WITH 4 WHEEL DRIVE AND LARGE EARTHMOVER TIRES
UPHILL REVERSE Front wheels provide greater amount of traction.
CENTER OF WEIGHT
UPHILL FORWARD Rear wheels provide greater amount of traction.
CENTER OF WEIGHT
MUD All wheels provide traction.
SAND All wheels provide traction.
CROWDING More traction on rear wheels when thrusting into pile.
WEIGHT
WEIGHT
SCOOPING More traction at front when scooping up load.
WEIGHT
WEIGHT

The Model HM is the biggest "PAYLOADER" and the most powerful wheeled tractor-shovel ever offered. This mighty workhorse is equipped with a 1½ cu. yd. bucket and has many profitable uses at both open pit and underground mines.

Some of its many applications are cleaning tops of coal veins, feeding stripping shovels, loading trucks, maintaining roads, moving tools and supplies . . . lifting, pushing, carrying.

Other features contributing to the outstanding performance of this PAYLOADER are the fully reversing transmission with four speeds in each direction, power-boosted steering, powerful hydraulic brakes and full double-acting hydraulic control of the booms and the bucket. The bucket can be quickly replaced by a bulldozer blade, crane hook or lift fork attachment.

Your Hough Distributor has full facts for you on the Model HM. See him today or write to The Frank G. Hough Co., 735 Sunnyside Avenue, Libertyville, Illinois.

WRITE **for literature on the Model HM or any other size PAYLOADER: the 1¼ yd. Model HL; the ¾ yd. Model HF; the ½ yd. Model HE; the 12 cu. ft. Model HA.**

SAY "HUFF"

PAYLOADER®

THE FRANK G. HOUGH CO. • *Since 1920*

COAL MEN ON THE JOB

SUPERVISORY ORGANIZATION (left) of the Imperial Smokeless Coal Co., Quinwood, W. Va., attending a regular monthly meeting.

on a 40% expansion of its steel-making facilities in Birmingham, Ala. The new facilities are expected to cost about $2,000,000 and will include additional electric-furnace capacity, a breakdown mill, a heating furnace and increased finishing capacity.

Link-Belt Co. has announced that its wholly-owned South African subsidiary, Link-Belt Africa, Ltd., incorporated last January, has purchased a 12,000-sq ft manufacturing plant, with separate office building, on a 12-acre plot in Springs, Transvaal, about 28 mi east of Johannesburg, where it will manufacture conveyor machinery and other Link-Belt products for South Africa. John E. Petersen, formerly divisional engineer at the company's Pershing Road plant in Chicago, has been appointed managing director of the South African Co., and Gene Zwerner, previously Link-Belt district sales engineer at Detroit, has been appointed sales manager. A. L. Endroll, formerly district sales engineer at its Atlanta plant, also is transferring to South Africa.

CORRECTION—As a result of an uncorrected typesetting error, the announcement of Goodman Mfg. Co. personnel changes in January COAL AGE (p 134) incorrectly reported the appointment of Mike Reid as sales manager with headquarters in Bluefield, W. Va. As the announcement indicated, Morris F. Cunningham is vice president in charge of sales for Goodman and William T. Ferguson is sales manager. Mr. Reid was promoted to sales engineer at Bluefield. The editors regret this erroneous report.

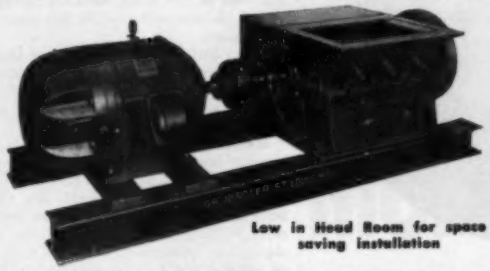
Coal Mining Institute Holds 64th Annual Meeting

. . . Begins on p 146

discharge of most of the clay in minus 100-mesh material in the tank overflow. Six banks of five tables each will reduce the ash in the ¼x0 from 15% to 7½%, and clean coal will be flumed to a settling tank. The coal discharged from the settling tank, at 25% surface moisture, will be fed to six Reineveld centrifuges to remove all but about 8% of the surface moisture preparatory to thermal drying.

"We selected the Reineveld machine because of its outstanding performance, low cost, mechanical ruggedness, high capacity and small physical size," Mr. Hyslop said. Effluent from the centrifuge will be returned to the settling tank for recirculation to avoid a build-up of fines in the circuit. Cyclone-type heat dryers, with an inlet gas temperature of 1,150 deg and ex-

GRUENDLER CRAFTSMANSHIP SERVING INDUSTRY 66 YEARS



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haust temperature of 115 deg, will entrain the fines for a fraction of a second to reduce moisture to 2½%. Dust in the exhaust gases will be suppressed in a 27x72x60-ft settling chamber. High-pressure fog nozzles near the top of the chamber will blanket the interior with fine spray, thus allaying the dust in the rising gases. Small-scale tests proved the feasibility of the method, Mr. Hyslop declared.

The ¼x⅜ size will be heat dried on a traveling woven-wire belt with a drying area of 144 sq ft. Down-draft hot gases will dry the coal on the belt, spent gases from the process also entering the settling chamber for dust suppression before final exhaust to the atmosphere. Exhaust gases from the fine-coal dryers are not used on the ¼x⅜ because the coal would be contaminated by the dust in such gases.

The plant has a minimum of chain and belt conveyors because all refuse is handled on belts, some of which are pitched to aid dewatering, Mr. Hyslop related.

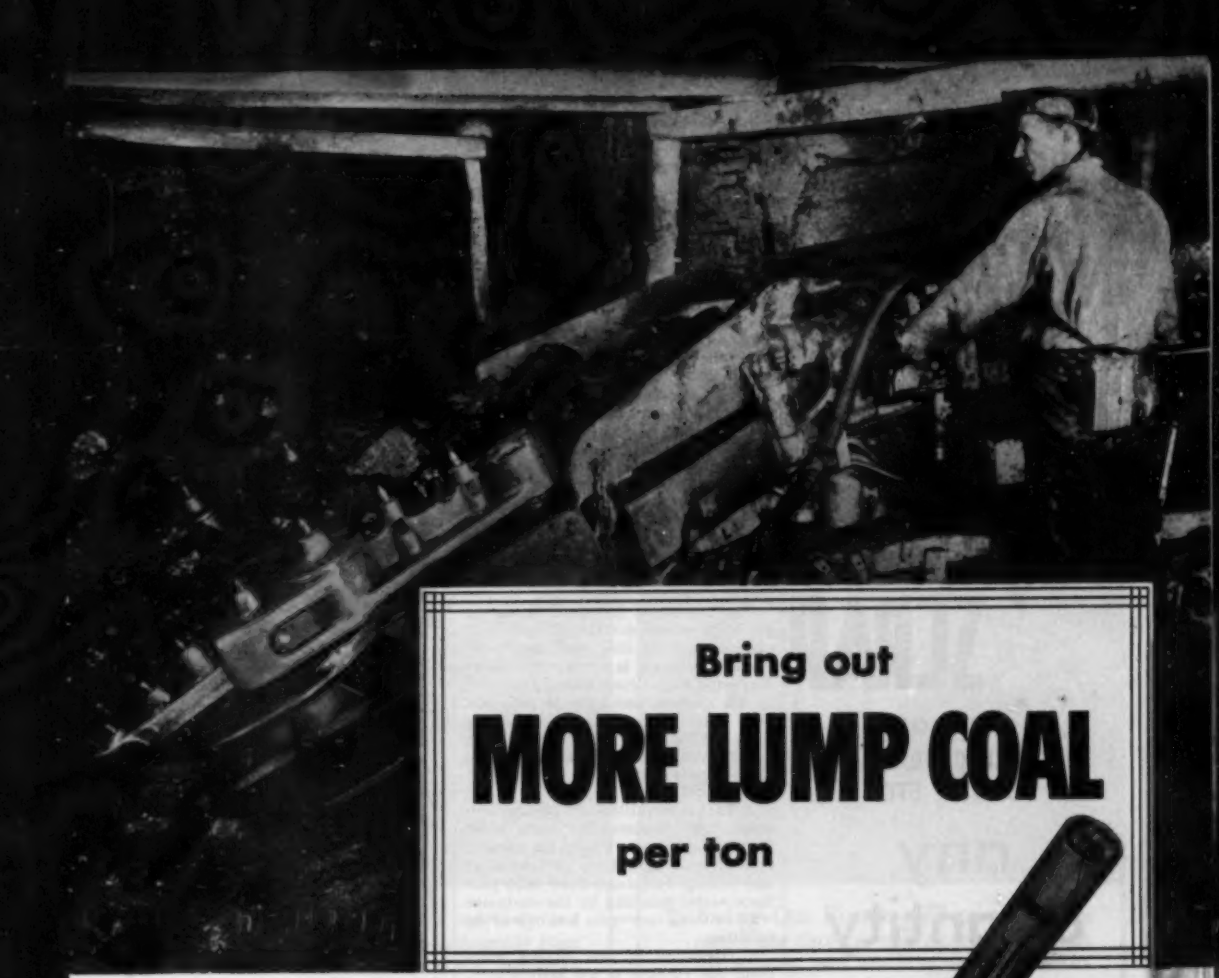
Mechanical cleaning plants have become necessary because of the high proportion of fines now produced by mechanical-loading methods, Mr. Calhoun declared, in describing two Rochester & Pittsburgh cleaning plants designed to produce high-grade steam or coking coal. Producing about 378 tph of clean coal, the plants utilize wet methods for cleaning and, as the final step, thermal drying.

Run-of-mine from the Freeport seams is dumped from 10-ton mine cars into a 50-ton surge bin above a variable-speed apron feeder. Storage bins were not used because size segregation, encountered in withdrawing coal from storage bins, seriously affects plant efficiency unless elaborate feeding equipment is used. The apron feeder elevates the mine run to a Bradford breaker, which reduces coal to minus 4 in and rejects rock, boney, wood and other materials that will not break as easily as coal. The breaker is spider-mounted, not shaft-mounted, to permit easier ejection of the material to be discarded.

Minus 4-in mine-run is elevated from the breaker to the top of the plant and fed to a Parrish shaking screen where fine coal is washed through ⅜-in round-hole stainless-steel plates. This is the smallest practical size for efficient screening without having too much water in the feed to the tables which follow.

The 4x⅜-in raw coal is cleaned at 1.65 sp gr in a Chance cone and then recleaned at 1.45 sp gr in another cone. Refuse from the first cone is crushed and conveyed to the refuse bin, while refuse from the second cone is crushed and used as a portion of the fuel for the company's central power plant.

The 4x⅜ clean coal is split into 4x2, 2x1¼ and 1¼x⅜ sizes. The 1¼x⅜



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is thermally dried on a McNally Visaac screen-type drier before loading.

The ¾x0 fines are sluiced from the raw coal-screens to three distributors for splitting among 18 Deister Diagonal-Deck tables which make a separation at 1.60 sp gr. The refuse from the tables is sluiced to a settling tank and conveyed to the refuse bin, along with the plus-¾ refuse, on belt conveyors.

Clean coal from the tables goes to a Robins dewatering screen where a size separation is made at ¼. Plus-¼ is dewatered on the screen. Minus-¼ passes through a settling tank to a CMI centrifugal dryer. Overflow from the settling tank is gathered in a 90-ft Dorr thickener, from which the overflow is recirculated to the raw-coal screen and the underflow, containing about 30% solids, is dried on Oliver disk-type filters.

The dewatered fine coal, consisting of ¾x¼ screen-dewatered coal, ¼x0 centrifuge-dried coal and minus 60-mesh filter cake, is conveyed to three Raymond flash driers where practically all surface moisture is removed. One large furnace supplies heat for flash drying.

Conclusions based on experience at these plants were cited by Mr. Calhoun as follows:

1. Large quantities of minus 200-mesh fines, produced by degradation during the process, hinder the natural flow of coal. Therefore, oil treatment and mixing with damp filter cake promote easier handling by the customer with existing conveyors and unloading facilities.

2. Operation of four drying units from one furnace is not satisfactory. A furnace should not serve more than two drying units.

3. Clarification in cyclones would help keep make-up water in step with the flow of coal through the plant.

4. Settling tanks are expensive, initially and maintenance-wise, and might be replaced with screen-and-cyclone combinations.

"Controlling Dust in Drilling Operations for Roof Bolts" was the subject of the lead-off paper, Friday morning, with C. W. Owings, mining engineer, U. S. Bureau of Mines, College Park, Md., speaking. The remainder of the morning session and all of the afternoon session was devoted to experiences with continuous-mining machines and methods. M. H. Forester, vice president, Pittsburgh Consolidation Coal Co., Pittsburgh, Pa., and chairman of the continuous-mining panel, related some of the high spots in the development of continuous mining machines. E. C. Anderson, electrical engineer, H. C. Frick Coke Co., Uniontown, Pa., presented a review of construction, operation and performance of the Konnerth machine. D. J. Keenan, Pennsylvania Department of Mines, Barnesboro, Pa., was chairman of the morning meeting.

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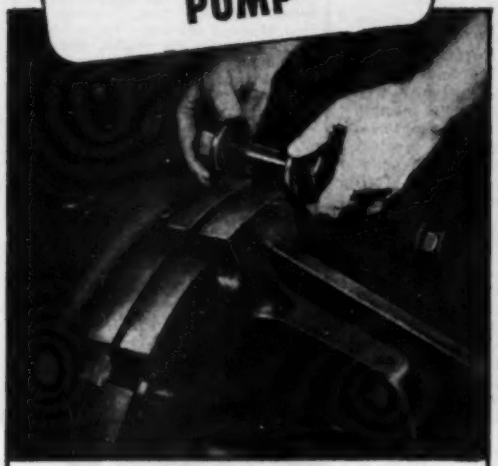
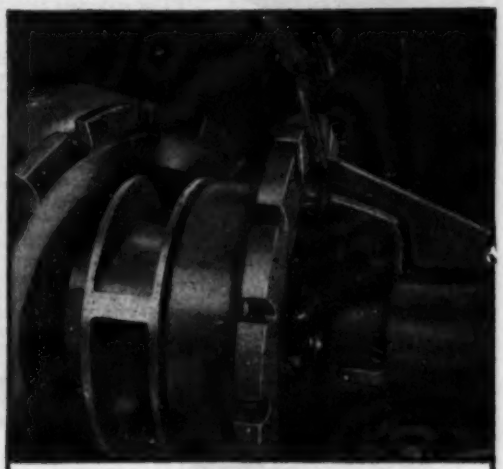


1. Remove Casing Bolts lift and disconnect drive. Just loosen bolts and bolt assembly from slot. Bolt, nut and washers are still connected for easy reassembly.



2. Swing Out Rotating Element. Neither suction nor discharge piping need be disturbed. All wearing parts are fully accessible for inspection or servicing.

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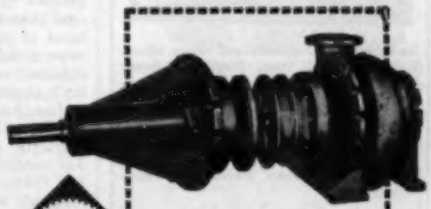

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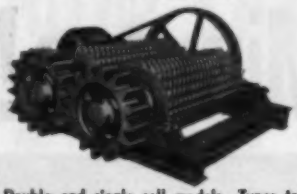

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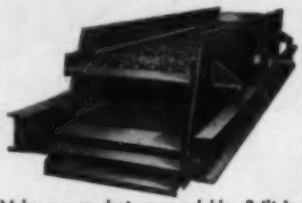

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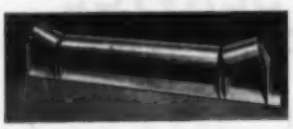

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quately in drilling holes for roof bolts, Mr. Owings pointed out, and while it has objectionable features, it is the only method permitted under the Federal Mine Safety Code where pneumatic tools are used. Dust concentrations can be reduced by wet drilling, but the availability of water and employee reaction to exposure to wet cuttings are among the problems to be faced.

With regard to dry drilling, Mr. Owings reported that several types of collectors have been tested but refinements are required. The major specification for a dry collector is a degree of mechanical integrity that will prevent human failures from adversely affecting dust concentrations. Ventilation as a dust-control medium also is important, Mr. Owings declared, in reporting that greatest benefits have been obtained in mines having volumes of from 6,000 to 8,000 cfm of air with a velocity of at least 125 fpm.

The U. S. Bureau of Mines has insufficient data to determine exact threshold limits for coal-mine dust, Mr. Owings said, but the Bureau does suggest holding maximum concentrations to values as follows:

1. The average full-shift exposure to dust should not exceed 20 million particles per cu ft. In drilling for roof bolting, dust counts should show less than 15 million particles per cu ft.

2. The maximum instantaneous exposure to dust should not exceed 40 million particles per cu ft.

3. The free-silica content of the dust should not exceed 5 million particles per cu ft.

The urgency of finding a solution to the dust problem in roof bolting is established by the fact that drilling in the roof places much more dust at the driller's breathing level than does drilling in horizontal holes, Mr. Owings pointed out.

In opening the panel survey of continuous mining, Mr. Forester presented a slide-illustrated review of some of the machines developed for single-process face operations. Urging the coal industry to support the development of continuous mining, Mr. Forester noted that skepticism of results obtained may result from the industry's expecting too much in too short a time. Among the machines illustrated were the McKinlay entry driver, Marietta miners, Konnerth machine, Joy continuous miner, Jeffrey-Sunnyhill Colmol, a Canadian machine for longwall work, Lee-Norse Koal Master, Goodman mining machine, and BCR's "portable laboratory" for continuous mining.

A new development in an auger-type machine for underground use also was described by Mr. Forester. The auger will work to right or left from a single set-up, and may prove to be the best method for thin-seam recovery, Mr. Forester ventured. The

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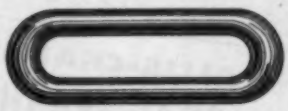

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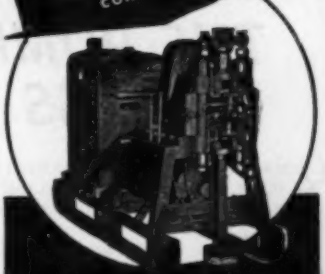

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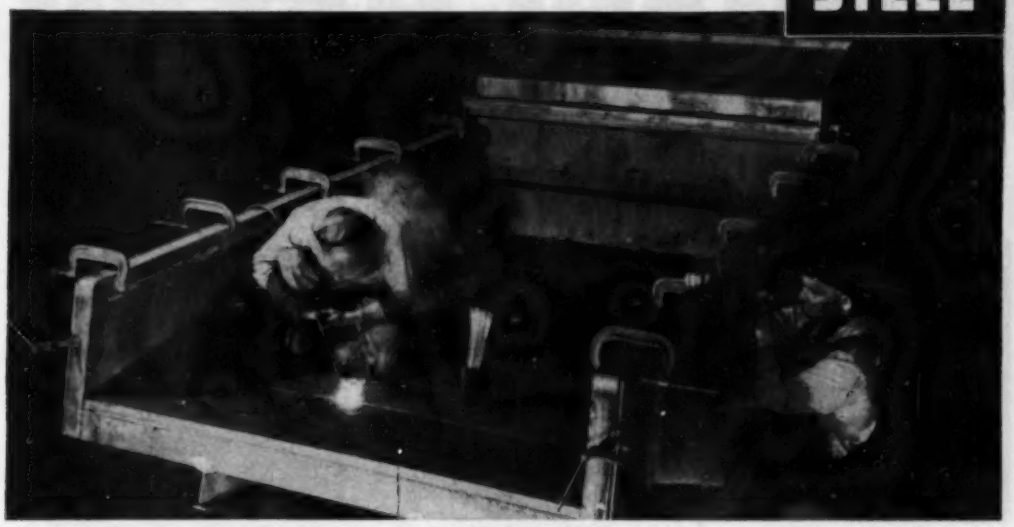

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The Moore Body Company of Reading, Pa., builds truck bodies for the mining industry where equipment really takes a beating. Moore has standardized on J&L Jalloy heat-treated plate to "armor" its truck-body bottoms against impact and abrasion.

The reason:—J&L Jalloy has a yield strength and Brinell hardness four times as great as mild steel. This makes it possible to cut deadweight by reducing plate thickness, and at the same time increase service life through Jalloy's high strength and wearing qualities.

For example, in Moore Body Company's 9 cu. yd. stripping body, 3/16" Jalloy has replaced 1/4" mild steel, and yet Jalloy's strength and hardness ensure increased resistance to abrasion and impact. Most important to cost-conscious mining men who must replace worn out truck beds—J&L JALLOY LASTS FOUR TIMES AS LONG AS MILD STEEL YET IT COSTS ONLY TWICE AS MUCH.

It's easy to see why more and more progressive mining companies have found that J&L Jalloy can do a dollar-saving job in such applications as chute liners, bulldozer blades, shovel buckets, and other places where impact and abrasion limit the life of equipment.

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machine permits selective mining, provides for good roof control and indicates recovery of from 50 to 60% of the coal.

The Konnerth machine, designed by K. L. Konnerth, assistant to the president—engineering, H. C. Frick Coke Co., Pittsburgh, Pa., was described by E. C. Anderson, electrical engineer of the same company, as to development and performance. The machine utilizes two side-by-side cutting chains to undercut the face, while two vibrating hammers, working against the face, produce a fracturing resonance in the coal.

The final design is a tread-mounted 33,600-lb unit with two undercutting chains 11 in apart, and provision for shear bars at the sides of the machine to further isolate the coal to be vibrated from the face. A chain conveyor between the undercutting bars carries the mined coal to a hopper which feeds the tail conveyor.

The hammer carriage, designed to swing 30 deg each side of center, is mounted above the undercutting chains, and is equipped with two Syntron vibrating hammers which strike 1,880 blows per min with 1-in stroke.

Tramming and cutting power is supplied by one 75-hp motor, and a separate m-g set provides power for the hammers. Maximum instantaneous power demand has been recorded as 145 kw, and maximum 15-min demand as 45 kw, Mr. Anderson reported.

A three-man crew—machine operator, helper and shuttle-car operator—average from 120 to 150 tons per shift. Other results have been encouraging, Mr. Anderson said. Sprays on the cutting bars effectively reduce dust concentrations and the size consist of the coal produced is satisfactory.

The Friday afternoon session was a continuation of the continuous mining theme, with H. P. Greenwald, director, Region 8, U. S. Bureau of Mines, Pittsburgh, presiding. Speakers were: E. R. Cooper, manager of mines, Jones & Laughlin Steel Corp., California, Pa.; M. A. Williams, general superintendent, Oglebay Norton & Co., St. Clairsville, Ohio; G. W. Stump, maintenance supervisor—Kent mines, Rochester & Pittsburgh Coal Co., Indiana, Pa.; C. W. Thompson, manager, National Mines Corp., Weirton W. Va.; J. M. Connor, vice president, Allegheny Pittsburgh Coal Co., Pittsburgh, Pa., and W. A. MacCalla, industrial power engineer, West Penn Power Co., Pittsburgh, Pa.

An account of efficient utilization of both low- and high-model Joy continuous miners in J&L mines was presented by Mr. Cooper. The high model is used in development work and the low model retreats this development work. The present mining system is a three-entry opening of 14-ft-wide headings on 100-ft centers, with 400-ft-long rooms off one side. The sys-

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tem is to be redesigned, Mr. Cooper said, to limit room length to 200 ft, thus cutting the haul for the shuttle cars.

Continuous mining holds great promise as a solution to the problem of mining under drawslate, Mr. Cooper declared. The high-model machine takes drawslate in development work, but the low model leaves the drawslate in place. The low model has been used in retreat work for the past 6 mo and 96% of its production was turned out without disturbing the drawslate, Mr. Cooper reported in pointing out this conclusion: At Vesta, continuous mining is the best approach to operating under drawslate.

Timbers are set on 3-ft centers under the drawslate, but, in development work, the machine makes a 9-ft advance and then is stopped while two timbers are set. Ventilation is improved because rooms are driven to the gob, thus eliminating doors. Size of the coal produced from the Pittsburgh seam by the miner is better than anticipated: 35% of the total is minus-¾. To ease the cleaning problem, cars from continuous-mining sections are distributed among cars from the conventional-mining sections to prevent surges of fines in the cleaning plant.

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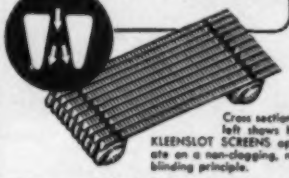

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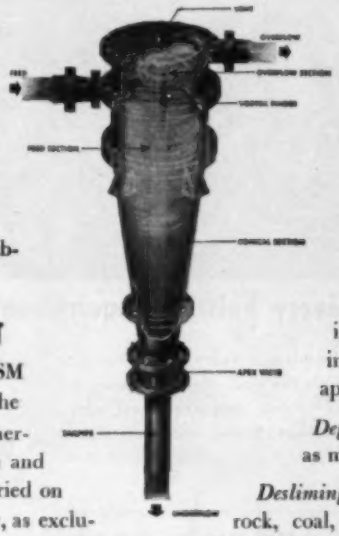
The DorrClone is a compact cylindro-conical classification unit utilizing centrifugal force in place of gravity. It provides a new method of separating finely divided solids in liquid suspensions and constitutes an important new tool with which to supplement current established practices.



RESEARCH AND DEVELOPMENT

Development of the DorrClone (DSM Cyclone) was begun in 1939 by the Dutch State Mines in The Netherlands, where a continuing research and development program has been carried on since that time. The Dorr Company, as exclusive licensee under the Dutch State Mines patent rights in all fields other than that of heavy media separation, has been actively engaged since 1948 in development work relating to design variables affecting performance, materials of construction and possible fields of commercial use. The result of this program is a carefully engineered unit, capable of controlled and predictable operation.

PRESENT AVAILABILITY

DorrClones are now available singly or in multiple arrangements in four standard sizes: 3″, 6″, 12″ and 24″ diameters.

APPLICATIONS

Standard units are now limited to separations in the 20 micron to 100 mesh range but present studies indicate broader applications in the future. Typical commercial applications proven to date are:

Degritting of viscous suspensions such as milk of lime and clay slurries.

Desliming of metallurgical pulps, phosphate rock, coal, iron ore and tailings for mine backfill, with the production of extremely dense underflows where such are desired.

Classification of crystalline and other granular suspensions.

PATENTS

The DorrClone is covered by patents issued and pending in the United States and other countries.

Further information... We welcome inquiries on specific problems and applications and are prepared to undertake engineering investigations within the scope of our present knowledge and experience.

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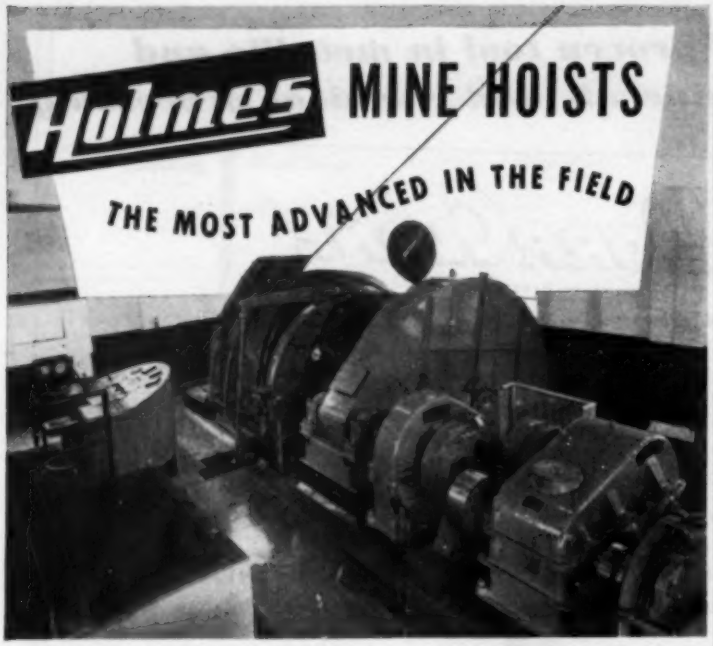

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Department A-4

ROBT. HOLMES & BROS., INC.
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Coal Mining Institute

tinuous mining at Saginaw mine, Oglebay Norton & Co., dictates the use of more of these machines as the mine expands, Mr. Williams said, noting that the new cleaning plant now under construction at Saginaw is not designed to handle drawslate because of the success achieved so far in holding it. Two low-type Joy units are in service in the Pittsburgh No. 8 seam for under-the-slate operation.

Cost per ton is lower than in conventional mining, over-all maintenance cost is down, productivity per man at the face is about 40 tons per man-shift and safety has improved as compared to previous experience with conventional mining in the same seam, Mr. Williams reported.

Although maintenance of equipment and elimination of outages still is a major problem, one machine has operated for 258 min without delay on one occasion at Saginaw, according to Mr. Williams.

Training and retraining of production crews and officials in the efficient employment and maintenance of continuous-mining equipment is a problem not to be minimized, Mr. Stump declared. With five continuous mining machines producing all the output of Kent No. 1, Rochester & Pittsburgh Coal Co., Mr. Stump reported, outages become somewhat prohibitive after a machine has produced from 30,000 to 40,000 tons. General overhaul of the machine becomes necessary at that time to reduce mechanical delays.

With regard to sizes produced from the Lower Freeport seam by continuous-mining machines, Mr. Stump offered the following average screen analyses: minus-¼, 46.1%; 1x¼, 31.4%; 2x1, 14.5%, and plus-2, 8.0%.

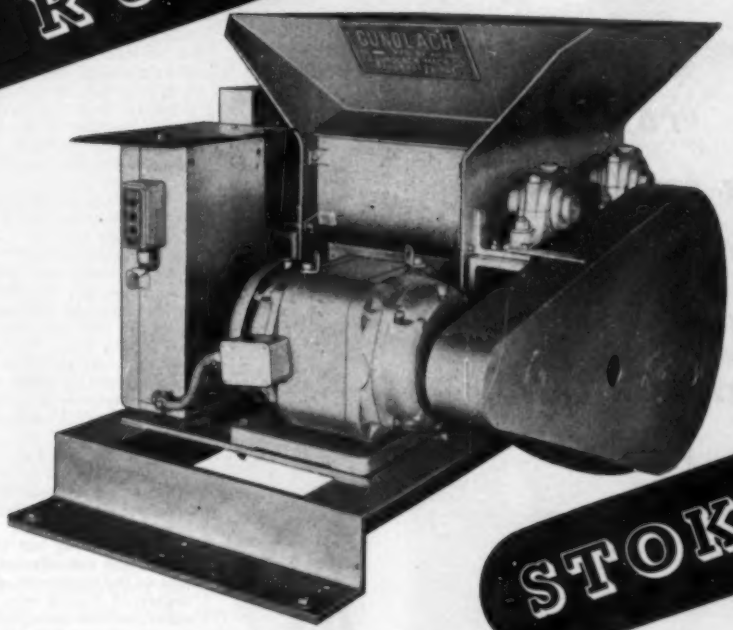
Concerning productivity, Mr. Stump reported the results of a survey taken over a period of 24 working days in March and April, 1950, when two continuous mining units were working on development and three on production. The figures reported are clean-coal tonnages and do not include the 15% cleaning-plant reject. On development work, average production per machine was 90 tons per shift, while on production work the average was 110 tons per shift per machine. Crews consist of six or seven men in single-machine sections, and 11 or 12 men in two-machine sections, with a mucker added for cleaning up fines on some shifts, he said.

In discussing a reference by Mr. Stump to the use of bolts and timbers for controlling bad sections of roof, Richard Maize, Pennsylvania Secretary of Mines, reported that hereafter any mine will be considered an individual problem with regard to the use of bolts without timbers in controlling the roof. If management of the mine is of the opinion that bolts will support the roof safely, an application for an inspection by Department of Mines personnel will initiate

FROM MINE RUN TO STOKER COAL WITH "*Two Stage*" CRUSHING IN ONE MACHINE!

MINE RUN

The GUNDLACH *"Two Stage"* Coal Crusher incorporates two crushing stages in one machine and is designed to reduce RUN-OF-MINE to STOKER COAL in ONE operation. Compact design simplifies structural supports and installation. Rugged simple construction combined with engineering proved in the field makes this machine a profitable and reliable unit.



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- All gears are steel cut; Timken roller bearings used throughout.
- Furnished with electric, gasoline or diesel power unit.
- Weight approximately two tons. Height 42" Width 47" Length 6'3" (Electric power unit)

Fulfilling an urgent need in the industry, the GUNDLACH *"Two Stage"* Crusher has delivered over 85% usable stoker coal from an Illinois mine run lot.

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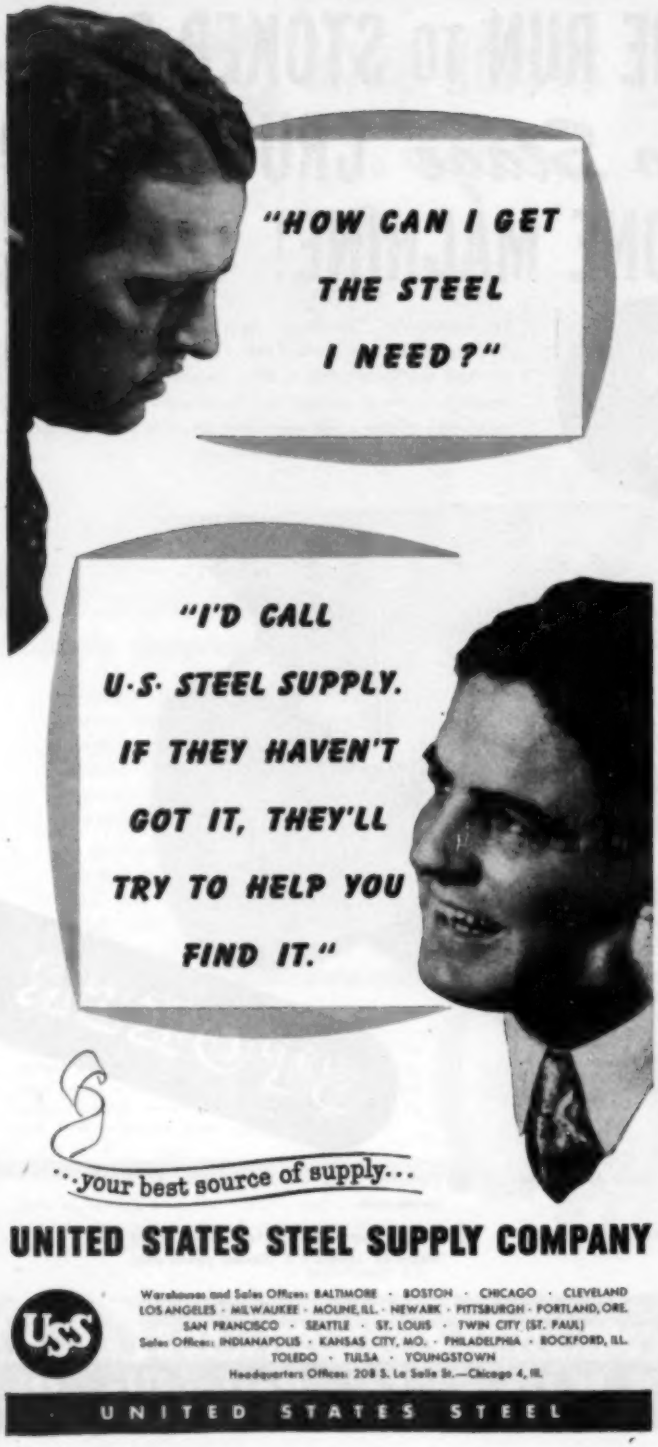
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Coal Mining Institute

such an inspection and result in a decision as to whether bolts may be used without timbers, Mr. Maize said.

Under adverse conditions, such as bad top, excess water and steep grades (15% maximum), a 31-in-high Colmol has averaged 21 tons for each operating cycle of 39 min, Mr. Thompson reported. The unit is operating in the 42-in-thick Upper Freeport seam in West Virginia with a 6-man crew, and consumes power at a rate of 5.24 kwh per ton.

The problem of intermediate haulage is under investigation, Mr. Thompson said, adding that a curved belt developed by National Mines Corp., Weirton, W. Va., gives promise of increasing productivity to 55 tons per man-shift for crew members. Motion pictures of the curved belt in operation on the surface, and of a traveling belt suspended from the roof over the main-entry belt, were shown by Mr. Thompson.

The traveling belt, which is a self-contained unit, moves toward the face of the entry on an overhead rail system suspended from roof bolts. As the face is advanced by continuous mining, the traveling belt follows the mining machine to provide continuous intermediate haulage. Sections are added to the main belt on the off-shift as required.

The curved belt is designed to carry room production to the entry belt in a continuous manner.

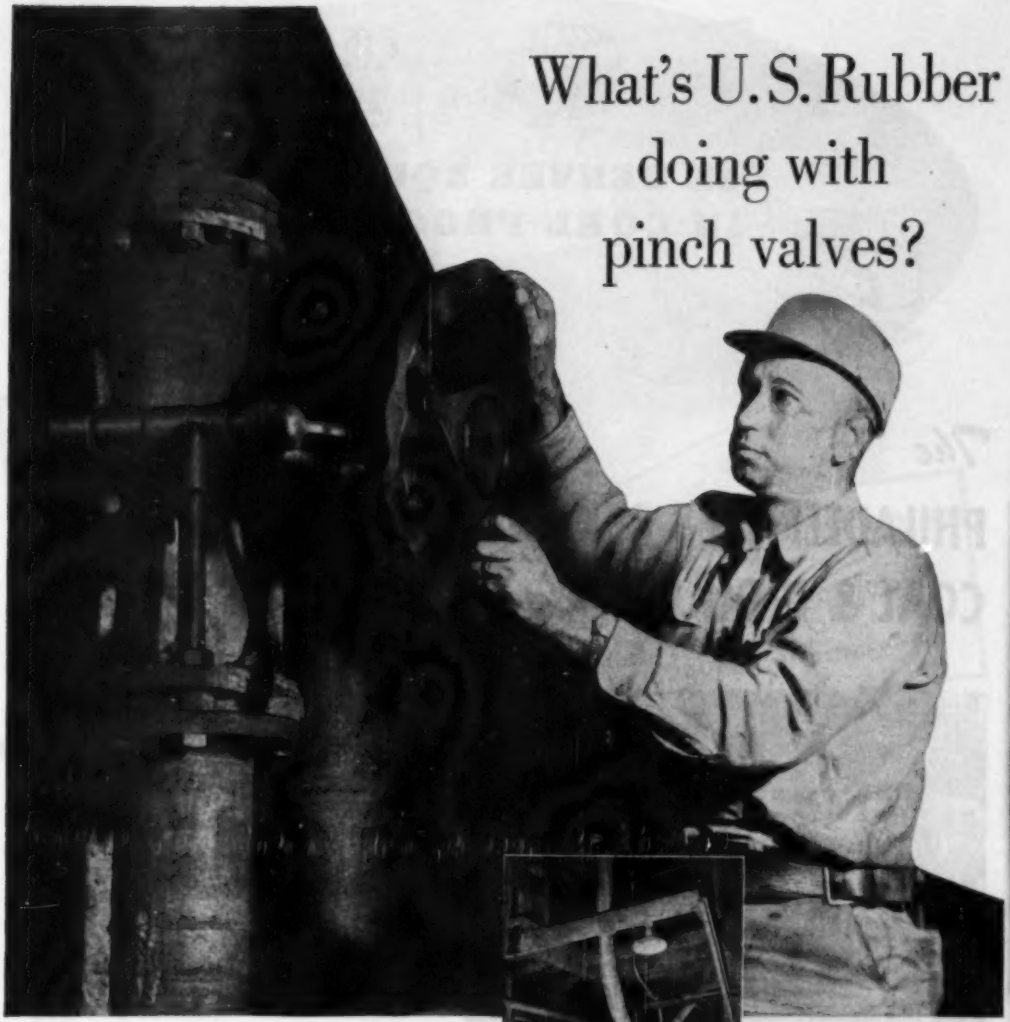
Interrupted delivery of a new continuous mining machine made it necessary for Mr. Connor to alter his original plan of discussing experience with the new machine. In brief remarks, Mr. Connor cautioned operators that only small opportunities for inceased mining efficiency with continuous methods are available where the efficiency of conventional mining already is high.

Power discipline is especially important in continuous mining because of the rapid advance of the workings and the high horsepower concentration in one machine, Mr. MacCalla said, in pointing out that power requirements are affected by such factors as the experience of the operator, degree of control over voltage drop, nature of the seam, condition of the equipment and type of work.

In stressing the need for efficient use of power as an economy measure, Mr. MacCalla noted the large annual increase in power consumed per mineworker employed. In 1930, the figure was 500 kwh per mineworker. Now, it is 10,000 kwh per mineworker.

In continuous mining, good voltage at the face is especially important because coal is more easily fractured at high chain speeds, thus raising tonnage. Mr. MacCalla suggested that in making voltage surveys, special attention be given to trailing cable, because it is possible to lose 20 v from nip to machine.

What's U.S. Rubber doing with pinch valves?



U.S. PILOT PINCH VALVE being adjusted by coal mine superintendent to control flow in preparation plant of large West Virginia mine. Mechanism is very compactly designed, can be refitted to new pinch valve bodies.

U.S. PILOT FLEXIBLE PIPE conveying sand and water in same preparation plant. Pipe is so flexible no elbows or short connections are needed. This particular pipe has been in service two and one half years so far, replacing a metal pipe which lasted only six months.

IN MANY coal preparation plants U.S. Pilot Pinch Valves control the flow of water containing abrasives. In the chemical industry, they handle corrosive mixtures, acids, and solids. They serve the paper industry, the food and beverage industry.

Another "U.S." product invaluable in coal washing is U.S. Pilot Flexible Pipe. The one at right carries up to 10,000 tons of sand a day. Both Pilot Pinch Valves and Flexible Pipe safeguard equipment from mechanical strain caused by vibration, expansion, contraction and "water-hammer."

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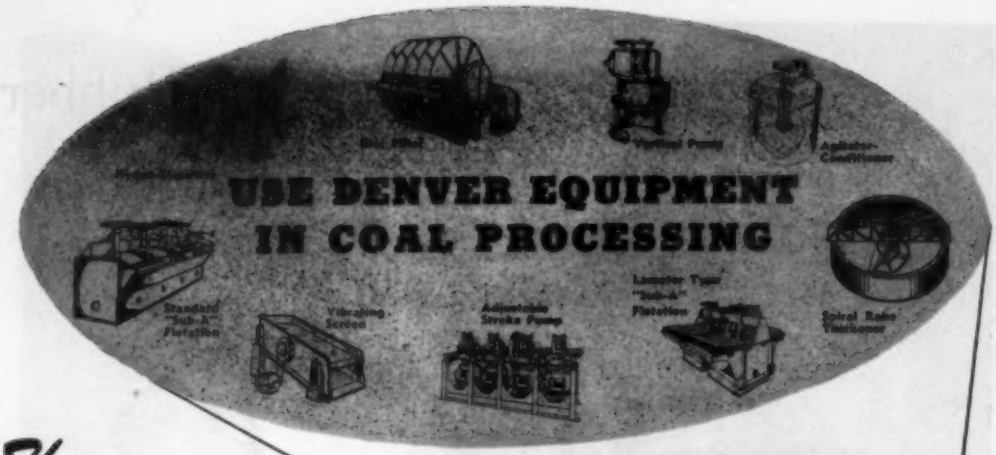

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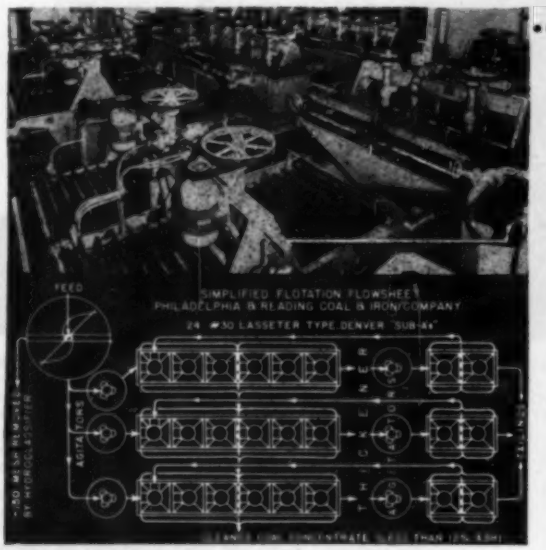

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Tonnage: 150 TPH initial feed.

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Flotation Concentrate: Sixty tons per hour. (One ton per minute.)

Ash Content: Less than 12 per cent.

Reagent Cost: Less than 15 cents per ton feed.

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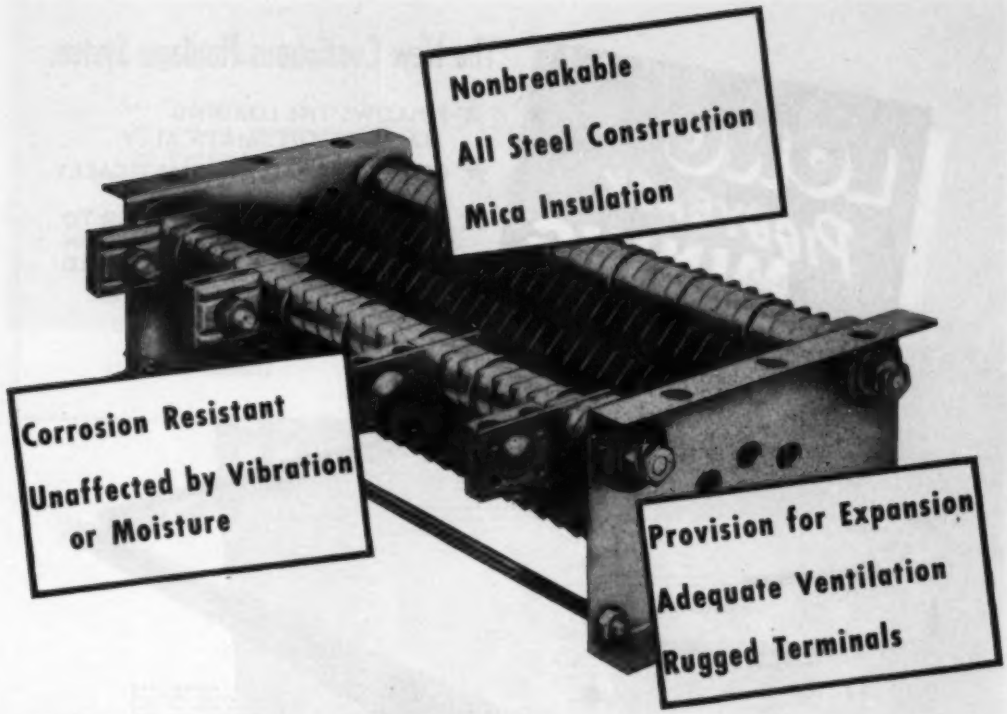

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- ★ FOLLOWS THE LOADING MACHINE AUTOMATICALLY
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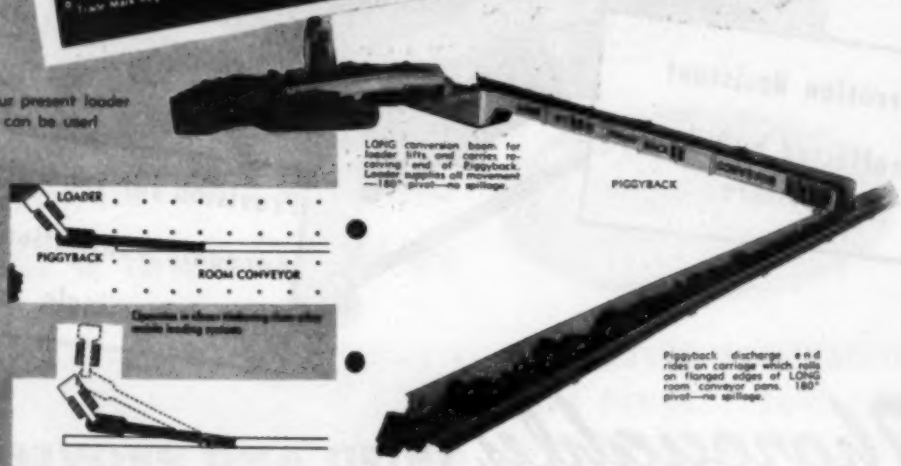
Your present loader can be used!



LONG conversion boom for loader lifts and carries receiving end of Piggyback. Loader supplies all movement —180° pivot—no spillage.

Piggyback discharge end rides on carriage which rolls on flanged edges of LONG room conveyor pans. 180° pivot—no spillage.

One man, with his helper, operates the loader-Piggyback-room conveyor combination as one machine. He devotes his full attention to keeping the loader in coal—loading continuously. He never has to look back to see if his receiving medium is in place —never has to reposition his rear conveyor—never has to tram coal on the loader—never has to stop for pan-ups during the loading cycle. No one else so much as pushes a button as the coal moves continuously out of the room.

Standard caterpillar-mounted loading machines are all adaptable to the Piggyback system. All that is required is a simple conversion consisting of removing the conventional swinging boom and replacing it wth a short, straight unit designed by LONG for use with the Piggyback. The one loading machine may load in two or more faces with room conveyor and Piggyback in each room.

Conversion to the Piggyback system is therefore possible with less cost and with far greater advantages to be gained than with any other mine modernization plan.

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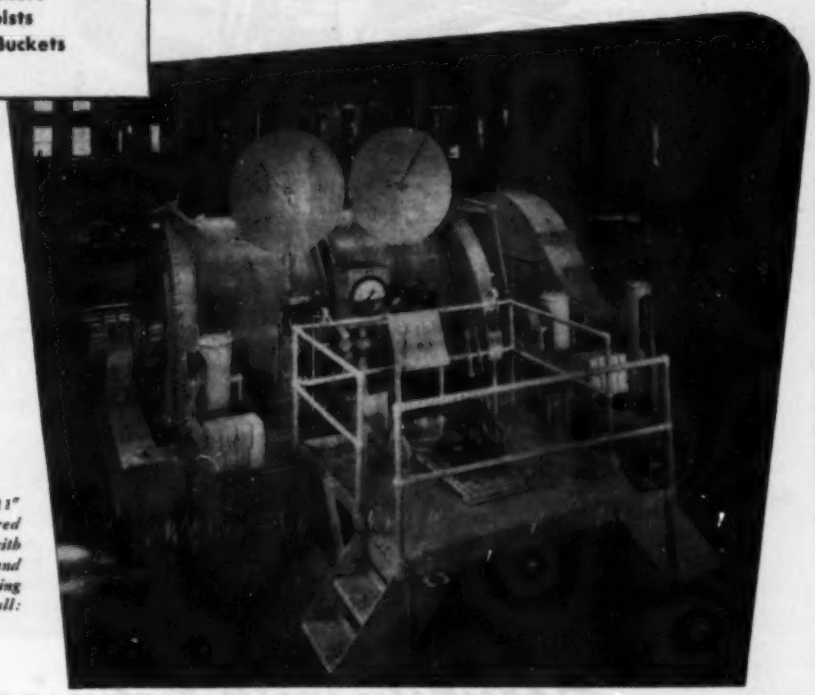

Wellman 10' x 4' 11" Double Drum Geared Electric Mine Hoist with 7' axial plate clutch and 10' x 13' Parallel Acting Brakes. Rated rope pull: 22,000 lbs.

● For more than half a century, in mines all over the world, Wellman Electric Mine Hoists have been used because they combine expert design with expert construction . . . featuring all the "modern improvements" developed in our 50 years' experience. Wellman Mine Hoists provide maximum safety, peak economy, and trouble-free operation under a wide variety of conditions. Let us give you recommendations for hoists that will do your job most satisfactorily.

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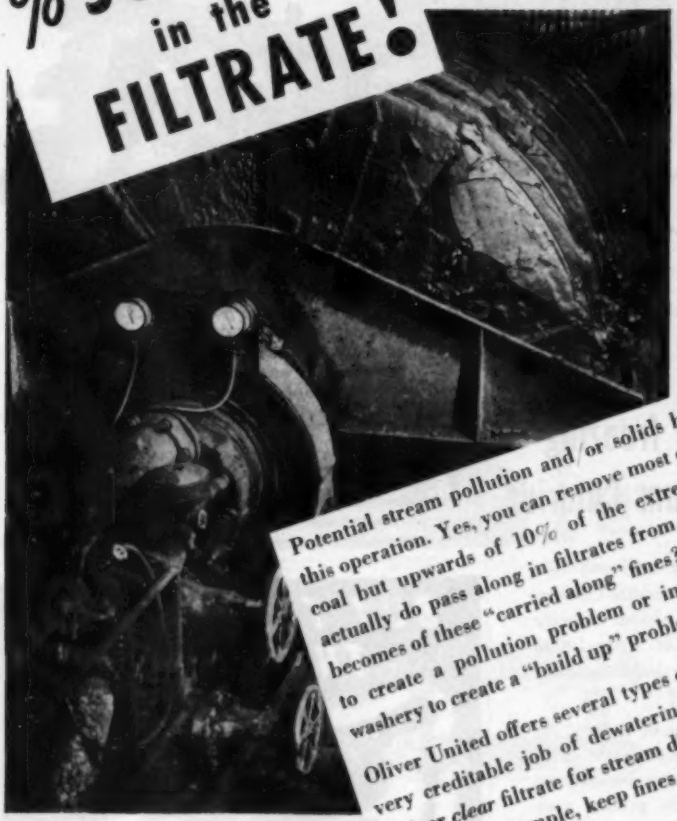
% SOLIDS in the FILTRATE!

. . . this is most important in dewatering 3/8x0 coal



Your objective in dewatering these fine sizes are:

1 . . . to get rid of as much water as possible, yes, but at the same time . . .

2 . . . to prevent extreme fines (under 200 mesh) from getting into re-circulation water or passing on to the river.

Potential stream pollution and/or solids buildup are tied in with this operation. Yes, you can remove most of the water on the 3/8 x 0 coal but upwards of 10% of the extreme fines readily can and actually do pass along in filtrates from some types of filters. What becomes of these "carried along" fines? They go either into a stream to create a pollution problem or into re-circulated water in the washery to create a "build up" problem.

Oliver United offers several types of filters, each of which can do a very creditable job of dewatering the coal *and* at the same time deliver *clear* filtrate for stream disposal or re-circulation. American Filters, for example, keep fines in the filtrate well under 1% which is no problem at all.

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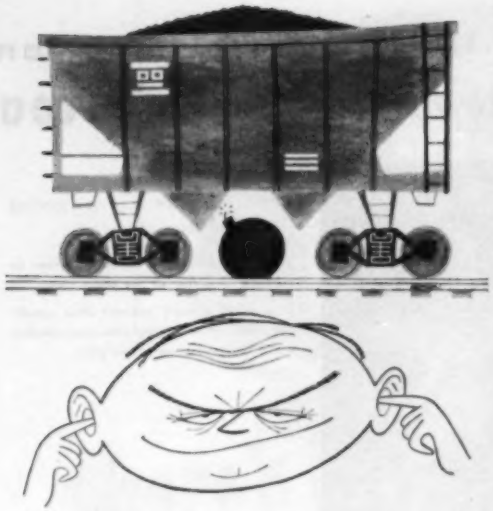

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EVEN in sub-zero weather your coal will flow freely when it's treated with Wyandotte Calcium Chloride. Just add Wyandotte Calcium Chloride to your coal as it's loaded in the car. From 100 to 400 pounds (depending upon the size of the coal) will freeze-proof a 50-ton carload.

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Send more information about what Wyandotte Calcium Chloride can do for me.

Name _____

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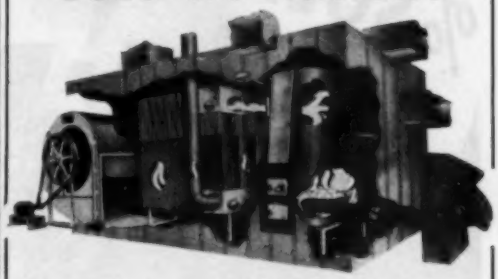
The best heating system for mine buildings . . .

USES NO WATER!



E. K. Campbell Heavy Duty

FURNACE FAN SYSTEM

- *No steam or return lines to freeze*
- *No unit heater CORES to leak*
- *No drain on your impounded water supply*

Avoid loss of production time with this PROVEN heating system—designed especially for coal mine buildings. Lower costs, better performance, wide coal field use.

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E. K. CAMPBELL COMPANY

KANSAS CITY 3, MISSOURI

BUY THE TOOL THAT'S BUILT FOR THE JOB!

The Cincinnati
TRADE MARK

ONE-MAN COAL DRILL

. . . specifically designed and built for drilling coal. Universal motor — operates on AC or DC current. Cuts costs. More power "pound for pound" — more efficiency day after day!

Write today for FREE illustrated bulletin.

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Division of The R. K. LeBlond Machine Tool Co

2635 MADISON ROAD • CINCINNATI 8, OHIO

Users Find that

COFFING *Safety-Pull* HOISTS

—MULTIPLY MANPOWER Extremely easy to operate, they help workmen do more work, faster, easier. Ruggedly built to handle wider range of jobs.

—COST LESS TO USE Moderately priced, Coffing Ratchet-Lever Hoists have many parts of drop-forged, heat-treated alloy steel, other long-life features to hold down replacement and maintenance costs.

—HELP RAISE SAFETY STANDARDS Coffing safety features include dual ratchet and pawl assembly that cannot slip or drop load; "Safety-Load" handle to avoid dangerous overloading.

WRITE FOR BULLETIN G2SP, giving full information on nine models of the Safety-Pull hoist—¾ to 15 tons capacity. See how they can help your workmen do *more* jobs—faster, easier, safer.

AMAZING HOIST-ALL IS A HOIST— A JACK—A PULLER

—3 useful tools in 1. Built in two sizes, 2000 lb. and 4000 lb. to handle scores of jobs. Send for G2HA.

COFFING HOIST COMPANY • Danville, Ill.

ELECTRIC, SPUR-GEARED AND DIFFERENTIAL CHAIN HOISTS; "MIGHTY MIDGET" PULLERS; LOAD BINDERS

PLATEGRIP

PLATE FASTENERS FOR CONVEYOR BELTS

Make strong dust-tight joints in belts of any width. Special design spreads tension firmly across belt, allow natural troughing of belt and assures smooth operation over flat, crowned or take-up pulleys. Sizes for belts of from ¼" to ⅝" thickness. Write for Catalog Sheet.

ARMSTRONG BRAY & CO.

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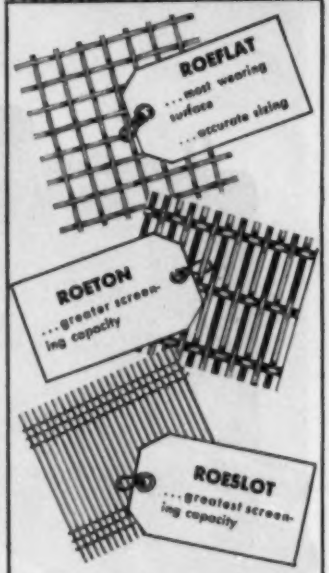
AGGREGATE SCREENS



A Roebling screen for every job

YOU'LL GET top efficiency and save money with the *right* Roebling Wire Screens. In the first place, one of the screen constructions shown above will give the sort of superior screening that really pays off. And on top of that, each of these constructions is available in Abraso (high carbon steel), Roetemp (oil tempered steel) and in Stainless Steel to meet and beat specific conditions that ordinarily shorten screen life.

Mail coupon today for information about Roebling Aggregate Screens.

WOVEN WIRE FABRICS DIVISION

JOHN A. ROEBLING'S SONS COMPANY

ROEBLING, NEW JERSEY

Woven Wire Fabrics Division
John A. Roebling's Sons Co., Roebling, N. J.

Gentlemen: Please send me free copy of Catalog W-903 giving up-to-the-minute information about Aggregate Screens.

Name.....

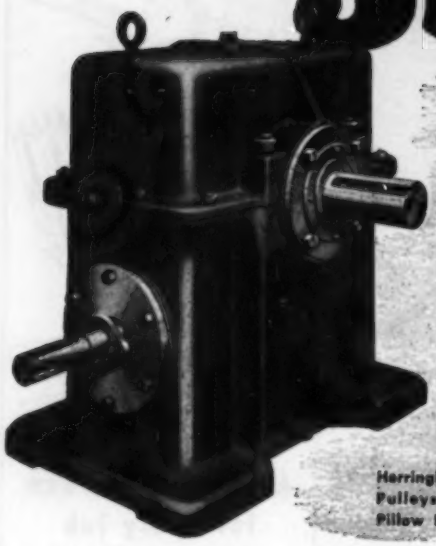
Company.....

Address.....

City.....State.....

ROEBLING

Jones



WORM GEAR SPEED REDUCERS

A right angle unit built for heavy duty performance in any industry. The worm can be above or below the gear. Shafts are single or double extended for coupling connections or chain or gear drives.

They are built in ratios from 4 to 1 to 90 to 1 and in capacities from ¼ to 100 H.P.

Bulletin No. 68 covers selection tables and dimensions.

W. A. JONES FOUNDRY & MACHINE CO.
4401 W. Roosevelt Rd., Chicago 24, Ill.

Since 1890 Jones In the Service of Industry

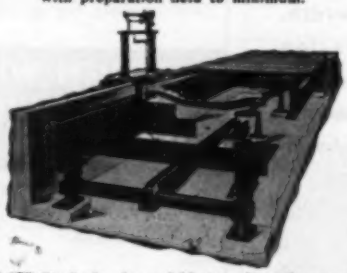
Herringbone — Worm — Spur — Gear Speed Reducers
Pulleys · Gears · V-Belt Sheaves · Anti-Friction
Pillow Blocks · Friction Clutches · Flexible Couplings

WINSLOW

Dependable — Accurate

TRUCK and TRACTOR TRAILER SCALES

TYPE "C. S." *Portable Scale*—easily and quickly set up—with preparation held to minimum.



TYPE "S" *Pit Scale*—for weighing trucks and tractor trailers—Platform lengths 18 ft. to 60 ft. inclusive.

WINSLOW SCALE COMPANY
TERRE HAUTE 1, INDIANA
Scale Manufacturers since 1896

New Folder for the ASKING

You should have this folder if you are concerned with handling quantities of flowable bulk materials. It tells you about the Super-Concrete Staves of which Neff & Fry Storage Bins are constructed; how the reinforcement is pre-stressed; how the bins are engineered to specific requirements.

The folder contains data on bin capacities. It lists the 86 kinds of materials now being handled in Neff & Fry silos. It gives you the names of prominent users. It contains eight photos of typical installations.

Spend five minutes reading the folder and you'll be a lot better informed on above-ground materials handling. Mail your request for a copy now while the subject is on your mind.

THE NEFF & FRY CO.
228 ELM STREET • CAMDEN, OHIO

Searchlight Can Help You!

HUNDREDS of miscellaneous business problems that confront you from time to time, can be quickly and easily solved through the use of the Searchlight Section of this or other McGraw-Hill publications.

The SEARCHLIGHT SECTION Classified Advertising of McGraw-Hill Publications

Can help you by bringing business needs of "opportunities" to the attention of other men associated in executive management, sales and responsible technical, engineering and operating capacities with the industries served by:

American Machinist
Aviation Week
Bus Transportation
Chemical Engineering
Chemical Industries
Coal Age
Construction Methods & Equipment
Electrical Construction & Maintenance
Electrical Merchandising
Electrical World
Electronics
Engineering and Mining Journal
Engineering News-Record
E. & M. J. Markets
Factory Management and Maintenance
Fleet Owner
Food Industries
Nucleonics
Operating Engineer
Power
Product Engineering
Textile World
Welding Engineer

The Searchlight Section is the classified advertising appearing in each of these papers. You can use it at small cost, to announce all kinds of business wants of interest to other men in the fields served by these publications. It is the regular meeting place of the man with a miscellaneous business need and the men who can fill that need.

When you want additional employees, want to buy or sell used or surplus equipment, want additional products to manufacture, seek additional capital, or have other miscellaneous business wants —advertise them in the Searchlight Section for quick, profitable results!

Classified Advertising Division

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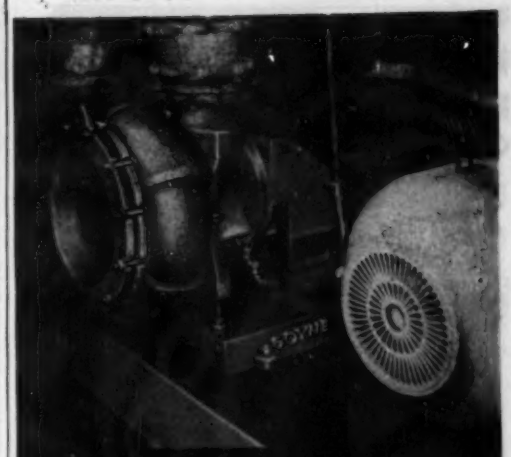

GOYNE SOLIDS HANDLING PUMP

Feature: LOW-COST OPERATION

GOYNE SOLIDS HANDLING PUMPS are extremely popular with a very large number of coal companies who find them quite reliable for pumping:

Liquids with solids added to increase specific gravities for coal and refuse separation in coal preparation plants.

Disposing of refuse and silt by pumping to waste material banks or for back filling into mined out areas.

Pumping prepared coal to temporarily desired storage areas.

These specially designed Goyne pumps incorporate numerous features to reduce upkeep and labor maintenance costs to a minimum:

1. Ease of inspection of all wearing parts. All internal portions are immediately accessible after removing *only* the *rear head of the pump.* No suction or discharge piping or any other major part of the pump is disturbed.

2. The only packing box of the pump is subjected to the low suction pressure rather than to the discharge pressure developed by the pump. This feature assures long packing and shaft sleeve life.

3. Impeller clearance is adjusted while the pump is running, insuring constant pump capacity so essential for uniform washing.

4. There are twenty-eight possible nozzle assembly combinations for each standard pump. Washery designers like this "adaptability feature" as it helps them out of tight places and simplifies piping.

5. Spare parts are carried in stock at our plant for prompt shipment. Reduce your inventory by using Goyne Process Pumps.

All inquiries are given a thorough engineering analysis and our prompt attention.

GOYNE MINE PUMPS 1881

The GOYNE STEAM PUMP CO.
ASHLAND, PA.

HOW TO *select and use* FUELS and FUEL COMBUSTION EQUIPMENT

JUST OUT!

THIS handbook presents comprehensive data covering the full range of commercial fuels and their combustion. It gives plant chiefs, testing engineers, plant equipment sales engineers, plant and plant equipment engineers, etc., practical aid in determining the fuels and fuel combustion equipment which can be used most efficiently for specific purposes. Supplying hundreds of tables, figures, graphs, and charts, the book serves as a ready reference not only on the properties, characteristics, and uses of all solid, liquid, and gaseous fuels, but also on such collary factors as heat balances, smoke prevention, and draft requirements. Contains a wealth of information for the combustion engineer, yet also includes firing and operating instruction that the boiler room operator will understand.

FUELS AND COMBUSTION HANDBOOK

Editor, ALLEN I. JOHNSON
Consulting Mechanical Engineer, Lansdowne, Pa.
Associate Editor, GEORGE H. AUTH
Professor of Mechanical Engineering, Villanova College

915 pages, 6 x 9, hundreds of illustrations, $12.50

BASED ON 456 major references written by some of the foremost authorities in the field, this comprehensive guidebook gives data on the properties, characteristics, and uses of all types of fuels—the various factors connected with the selection and purchase of fuels—the preparation of fuels for utilization—fuel handling and storing—and the transfer and generation of heat.

It embodies many advances and developments in synthetic fuels; the heat pump; gas turbines; spreader stokers; combustion; furnace and equipment design; package boilers, etc.

In addition to many illustrations and line drawings, the book's wide use of the rapid computation technique of alignment charts—together with the substitution of tables and graphs, wherever possible, for formulas—provides quick solutions to problems in the selection and use of fuels and combustion equipment. For example, easy-to-understand comparative tables enable you to look up quickly the advantages, disadvantages, features, performance data, and applications of various optional equipment.

Economics of Fuel Gas from Coal

An overall, realistic view of what has been done in manufacturing fuel gas from coal at a cost permitting its substitution for other fuels and what may be done in the future. Looks at both the advantages and disadvantages of such a process, not only tying together the technological and cost factors concerned but also presenting a large body of cost data on other fuels. By BATTELLE MEMORIAL INSTITUTE, John F. Foster, and Richard J. Lund, Editors; for BITUMINOUS COAL RESEARCH, INC., 280 pages, 66 illus., 39 tables, $5.00.

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McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18

Send me the book(s) checked below for 10 days' examination on approval. If satisfactory I will send my remittance, plus a few cents for postage, at the end of the 10-day examination period. If not satisfactory I will return the book(s) postpaid.

☐ JOHNSON and AUTH—Fuels and Combustion Handbook, $12.50
☐ BATTELLE MEMORIAL INSTITUTE—Economics of Fuel Gas From Coal, $5.00

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This offer applies to U. S. only.

"Sutton" SAND DRYING STOVES

The Standard for Over Forty Years

Burns Any Type of Fuel

The "Sutton" Sand Dryer may be fired with any type of fuel. While most "Sutton" Sand Dryers are equipped to burn coal, they can be furnished with burners for natural gas or fuel oil.

"SUTTON" FEATURES

- Simple in operation
- No skilled labor necessary
- Made in four sizes
- Lowest original cost
- Economical upkeep
- Topmost efficiency

SATISFACTION GUARANTEED
Catalog and Prices sent upon request

INDIANA FOUNDRY COMPANY
950 Oak Street Indiana, Pa.

"We look into the Earth"

CORE DRILLING *—anywhere*

PENNSYLVANIA Drilling CO.
DRILLING CONTRACTORS AND MFRS.
1205 Chartiers Ave. **PITTSBURGH, PA.** WAlnut 1-5814

PERFORATED METAL
COAL MINING SCREENS
Manufactured exactly to your specifications.
Any size or style screen, in thickness of steel wanted with any size perforation desired.
We can promptly duplicate your present screens at lowest prices.
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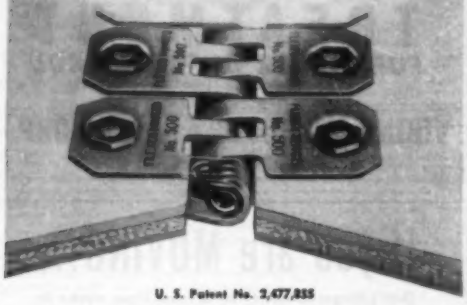
2442 West 24th Place
CHICAGO 8, ILL. VI. 7-6737

... the new separable

FLEXCO HINGED
BELT FASTENERS



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- For joining underground extension conveyors.
- A FLEXCO fastener that is HINGED. Has removable hinge pin.
- Troughs naturally, operates smoothly through take-up pulleys.
- Strong, durable . . . pull or tension is distributed uniformly across joint.
- For conveyor belts ⅜" to ½" thick.

Order From Your Supply House. Ask for Bulletin HF 500.

FLEXIBLE STEEL LACING CO
4638 Lexington St., Chicago 44, Ill.

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—for bringing business needs or "opportunities" to the attention of men associated in executive, management, sales and responsible technical, engineering and operating capacities with the industries served by the following McGraw-Hill publications:

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Built for PERFORMANCE
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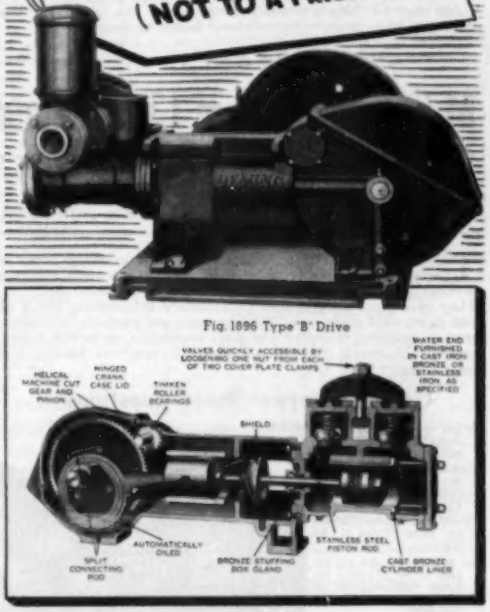
Fig. 1896 Type 'B' Drive
VALVES QUICKLY ACCESSIBLE BY LOOSENING ONE NUT FROM EACH OF TWO COVER PLATE CLAMPS
WATER END FURNISHED IN CAST IRON, BRONZE OR STAINLESS IRON AS SPECIFIED
HELICAL MACHINE CUT GEAR AND PINION
HINGED CRANK CASE LID
TIMKEN ROLLER BEARINGS
SHIELD
AUTOMATICALLY OILED
SPLIT CONNECTING ROD
BRONZE STUFFING BOX GLAND
STAINLESS STEEL PISTON ROD
CAST BRONZE CYLINDER LINER

Fig. 1896

DEMING "OIL-RITE"
Double-Acting Mine Pumps

PERFORMANCE...not price...determines the economy of using these heavy duty, reciprocating power piston pumps in mine gathering service.

Timken tapered roller bearings on pinion shaft are adjustable to compensate for wear after long service. Stainless steel piston rod resists scoring and corrosion. Pinion of high carbon steel has machine-cut, helical teeth and is keyed to a ground and polished shaft of extra large diameter.

Those are just "samples" of the high standards of engineering and manufacturing that make Deming Fig. 1896 "Oil-Rite" pumps so dependable and economical for mine gathering duty.

Write for full details about Fig. 1896.

THE DEMING COMPANY
533 Broadway • Salem, Ohio

DEMING mine pumps

The greatest help a coal mining man can have—

IF YOU want to make sure of getting your certificate of competency—sure of winning a bigger job with bigger pay, get Beard's great books today and put them to work for you.

In these three books you have a practical, always-on-the-job guide that will help you solve the problems you face every day, show you what to do, tell you why it should be done.

Beard's

Mine Examination Questions and Answers

3 Volumes—$9.50, Payable in Three Easy Installments

THESE books explain what a man must know in order to become a mine inspector, a mine foreman, assistant foreman, fireboss, hoisting engineer, safety engineer, shot-firer, etc. They give you complete and authoritative information about air and gases, explosives, safety requirements and methods, mechanics, engines, hoisting, drainage, pumping, ventilation, timbering, instruments, and every other detail that the practical mining man must know.

Can you answer these questions—

What is meant by splitting the air current and what are the advantages derived from such methods?

Can a miner live in air in which the oxygen content is reduced to 17 per cent?

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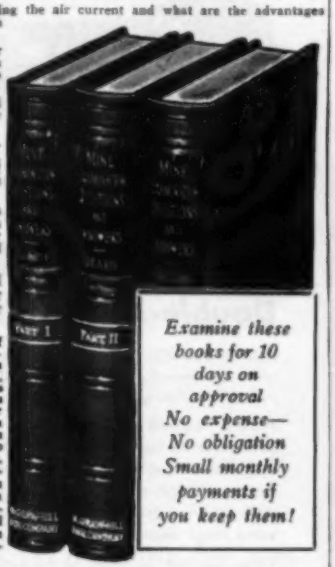
In what time can an engine of 40 effective hp. pump 4,000 cu. ft. of water from a shaft 360 feet deep?

What are the advantages and disadvantages of a gasoline pump, an air pump and an electrical pump?

What is the estimated tonnage per acre, per foot of thickness, for bituminous coal?

These are but a few of the more than 2,000 questions given in Beard's books together with full, correct answers. Hundreds of men have used this method to prepare for higher, better jobs. You can, too, if you have the Beard books and plan to use them systematically. They are the best investment that a mining man can make—not only as an aid for passing examinations but as practical reference volumes on everyday mining operation problems.



Examine these books for 10 days on approval
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No obligation
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McGraw-Hill Book Co., Inc., 330 West 42nd St., New York

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Company .....

Position C-2-51

Viking

HOT VAPOR OIL TREATMENT

FOR BETTER DUST CONTROL

Write for Details

VIKING MACHINERY SALES CORP.

JACKSON, MICHIGAN

If you are MOVING...

Don't forget to notify us at least three weeks in advance to insure uninterrupted service to your subscripion to COAL AGE.

Please send your change of address together with your old address to:

DIRECTOR of CIRCULATION
COAL AGE, 330 West 42nd Street
New York 18, N. Y.

DON'T FORGET TO NOTIFY YOUR POSTMASTER, TOO!

SOLVE

MAINTENANCE PROBLEMS WITH THE WORLD'S FASTEST RUST SOLVENT

Cabot's Tasgon is the fastest, most effective rust solvent on the market. Tasgon loosens frozen nuts, unions, fittings, almost instantly. Cuts through gummed-up oil — tar — paint — quickly and efficiently.

WRITE TODAY FOR FREE SAMPLE!

Try it yourself. See how Tasgon solves maintenance and salvage problems and saves dollars! Samuel Cabot, Inc., 223 Oliver Bldg., Boston 9, Mass.

TASGON

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Not available for equipment advertising
$1.20 a line. Minimum 4 lines. To figure advance payment count 5 average words as a line. (See ¶ on Box Numbers.)
EMPLOYMENT WANTED and Individual Selling Opportunity undisplayed rate is one-half of above rate, payable in advance.
PROPOSALS, $1.20 cents a line an insertion.

INFORMATION:

BOX NUMBERS count one additional line in undisplayed ads.

DISCOUNT OF 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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The advertising rate is $9.25 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request. AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page.

NEW ADVERTISEMENTS received by 10 A.M. February 15th at the New York Office, 330 W. 42nd St., N. Y. 18, N. Y., will appear in the March issue subject to limitations of space available.

Engineers-Executives-Technical Men

Salaried Position, $4,000 to $30,000. This Confidential service for men who desire a new connection, will develop and conduct preliminary negotiations without risk to present position. Send name and address for details.

TOMSETT ASSOCIATES
1206-2 Berger Bldg. Pittsburgh 19, Pa.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS WANTED

MASTER MECHANIC. Chief Electrician or Shop Foreman, over 20 years experience, technical education, or what can you offer in the way of a position to start with your company. PW 7846, Coal Age.

MINING ENGINEER. Experienced mine development, railroad-road construction, stripping and general engineering. Employed, married, 48. PW 8572, Coal Age.

WANTED—POSITION in operating, safety or personnel department. Thoroughly experienced in hand, mechanical and strip mining. Now employed desire change. References. PW 8608, Coal Age.

BUSINESS OPPORTUNITY

For Sale: Small Mechanized Mine
Southern West Virginia. 500 acres Buckley & Pire Creek Coal. BO 8552, Coal Age.

WANTED TO buy or lease coal mine in the low volatile fields. Also interested in undeveloped acreage these districts. Reply to BO 8812, Coal Age.

WANTED

Strip Coal Property with or near Loading Facilities.
Stripping equipment now available to produce 1500 Tons per day.
Prefer West Virginia Properties.
Contact, Tuskahoe Mining Company, Inc., Box 266, Tuskahoe, New York

FOR LEASE AT 35c PER TON; 174 ACRES LEVEL LAND, PARTLY DRILLED
OHIO STRIP COAL
S.W. Jackson Township, Mahoning County, O. 12 to 40 foot overburden with no hard rock. 3½ to 4 foot good coal on hard surface roads. Close to Ponna, B.R. Youngstown 15, Warren 16 and Akron 36 miles. Will sign option contract which guarantees worthwhile drilling.
Owner: Donald Kirk, Axis, Ala. Ph. Mobile 2-7030

FOR SALE

A modern coal mine opened 1946 —all new equipment producing (900) tons daily in the famous Chilton seam. Loading (4) grades of all purpose By-product coal. Located on C&O Railroad.

Logan County, W. Va.

Address Box 55
Stollings, W. Va.

MOTOR GENERATORS

1—500 KW G.E. Syn. 275 V. 900 RPM 3 Ph. 60 Cy. 440/2300/4000 V. AC
1—500 KW G.E. Syn. 275 V. 1200 RPM 3 Ph. 60 Cy., 2300/4000 V. AC
1—300 KW G.E. Syn. 275 V. 1200 RPM 3 Ph. 60 Cy. 2300/4000 V. AC
1—300 KW Ridgway Syn. 275 V. 900 RPM 3 Ph. 60 Cy. 2300 V. AC
1—100 KW G.E. Ind. 275 V. 1200 RPM 3 Ph. 60 Cy. 2300/4000 V. AC

ROTARY CONVERTERS

1—500 KW G.E. Syn. 275 V. 1200 RPM HCC. 6 Ph. 60 Cy. Transformers
2—300 KW G.E. Syn. 275 V. 1200 RPM HCC. 6 Ph. 60 Cy. Transformers
1—150 KW G.E. Syn. 275 V. 1200 RPM HCC. 6 Ph. 60 Cy. Transformers
1—150 KW West. Syn. 275 V. 1200 RPM 6 Ph. 60 Cy. Transformers

LOCOMOTIVE ARMATURES

MH-79-500 V. MH-77-250 V. 905-C-500 V.
907-C-250 V. 906-C-250 V. 903-C-250 V.
901-C-250 V. 158-C-250 V. 34-B-250 V.
MH-824-A 500/250 V.

LOCOMOTIVES

2—30 T JEFFREY 250 V. MH-77 42-36" Ga.
1—35 T G.E. 500/250 V. MH-824-A 44-36" Ga.
1—20 T JEFFREY 250 V. MH-77 42-36" Ga.
2—13 T JEFFREY 250 V. MH-2110 42-32" Ga.
1—13 T GOODMAN 250 V. 158-B 36" Ga.
1—10 T JEFFREY 250 V. MH-2110 42-36" Ga.
2—10 T JEFFREY 250 V. MH-110 42-36" Ga.
1—10 T G.E. 250 V. MH-825-A 36" Ga.
2—10 T GOODMAN 250 V. 34-B 36" Ga.
2 8 T JEFFREY 250 V. MH-100 42-36" Ga.
1— 8 T WEST. 250 V. ML-906-C 44-36" Ga.
2— 6 T JEFFREY 250 V. MH-66 44-36" Ga.

LOCOMOTIVE MOTORS

2—JEFFREY 250 V. MH-77, Ball Bearing
2—WEST. 250 V. ML-909-C, Ball Bearing
1—WEST. 250 V. ML-907-C, Ball Bearing
2—WEST. 250 V. ML-906-C, Ball Bearing
1—WEST. 500 V. ML-907-C, Ball Bearing
3—WEST. 250 V. ML-904-B, S. B. (New)
4—WEST. 250 V. ML-901-C, Ball Bearing
2—G.E. 500/250 V. MM-824-A, Ball Bearing
2—G.E. 85/125 V. MM-825-A, Ball Bearing

ARMATURES

1—300 KW G.E. 275 MPC Generator 900 RPM
1—300 KW G.E. 275 V. HCC Converter 1200 RPM

WALLACE E. KIRK COMPANY

501 GRANT BUILDING **PITTSBURGH 19, PENNSYLVANIA**

2—Goodman Style G20B77 permissible Shaker Conveyors, latest type, with manual type HAD duckbill and 20 HP Westinghouse AC motor, 3 phase, 60 cycle, 220 volt, 1160 RPM.

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Qu.	H.P.	Make	Type	Volts	R.P.M.
1	400	G.E.	DK	2200	514
1	400	G.E.	KT-413	2200	450
1	300	Al. Ch.	AR	440	1760
1	200	Whse.	CR	2200	1150
1	200	Al. Ch.	AR	220/440	880
2	125	Al. Ch.	AR	2200	1750
1	125	Whse.	CR-741	440	1750
1	125	G.E.	KT-410	2200	875
2	125	C.W.	1340	440	450
2	100	Whse.	CR-852	440	1750
1	100	Al. Ch.	AR-220	2200	1180
5	100	F.M.	HH-351C	440	885
1	100	Al. Ch.	AR	550	880
1	100	F.M.	H-341B	440	450
1	100	Whse.	CR-928	2200	514
1	100	Al. Ch.	AR	440	885

SYNCHRONOUS MOTORS
3-Phase, 60-Cycle

Qu.	H.P.	Make	P.F.	Volts	R.P.M.
1	1500	Whse.	.8	2200	720
1	750	G.E.	.8	2300	720
1	450	G.E.	.8	440	900
1	400	Whse.	.8	440	900
1	300	Al. Ch.	1.	2200	900
2	250	Al. Ch.	.8	2300	514
1	200	Whse.	.8	440	900
1	150	G.E.	1.	2200	900
1	150	G.E.	.8	440	900
1	150	G.E.	.8	2300	600
3	125	Al. Ch.	1.	4000/2400	900
1	125	Al. Ch.	.8	2200	600
3	100	Whse.	.8	440	1800
1	100	Whse.	1.	2300	1200
1	100	Ideal	.8	440	900
1	100	G.E.	.8	440	600
1	60	G.E.	.8	440	1200
2	50	G.E.	.8	2300	900

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Qu.	HP	Make	Type	Volts	RPM
1***	1000	Al. Ch.	AMT	2200	257
1	1000	Whse.	CW	2200	414
1**	600	G.E.	MT-413	2200	428
1	600	G.E.	I-16-M	2200	428
1***	450	G.E.	MT-574	550	885
1**	450	G.E.	I-M	2200	885
1**	400	Al. Ch.	AMT	2200	885
1	400	G.E.	MT-413	2200	440
1	300	G.E.	I-F16-M	2300	1200
1	300	Al. Ch.	AMT	2300	885
1	250	Al. Ch.	AMT	440	440
1	250	Whse.	CW-1108	2200	880
1	250	Whse.	C.W.	550	514
1	250	G.E.	MT-414	2300	885
1	200	G.E.	I.M.	2300	600
1	150	G.E.	I-H19 M	2300	1750
1***	125	Whse.	C.W.-870	2200	900
1	100	Al. Ch.	AMT	440	1180
1	100	F.M.	420-C	440	880
1	75	G.E.	I.M.	440	885
1	50	G.E.	MT-580	2300	1150

—Mill type pedestal bearing. *—2-bearing.

TRANSFORMERS (Oil Cooled)

Qu.	K.V.A.	Make	Type	Phase	Voltage
2	4500	G.E.	HT	3	27000/13800/2300
3	4000	G.E.	H	3	23000/2300/4000 Y
1	3750	Whse.	S	3	67000/14400/2400
5	500	G.E.	HT	3	14400/13200/480
2	400	G.E.	H	3	13200/11500/230/440
9	200	Pitts	OISC	1	14400/13200/230/440
20	100	G.E.	HT	1	14400/13270/240/480
3	100	Whse.	AUTO	1	9400/4160Y/1355/2400Y
2	100	Whse.	SH	3	13675/10605/230/460
8	75	G.E.	KF	1	3400/4160Y/120/240

MOTOR GENERATOR SETS

Qu.	KW	Make	R.P.M.	Volts DC	Volts AC
1	750	Whse.	900	600	2200
1	700 (SU)	G.E.	720	250	2200
1	500	G.E.	720	250	2200
1	500	AL	720	525	2200
1	500 (SU)	Whse.	1200	120/240	4000/2300
1	500	Whse.	900	600	2200
1	300	Ridgway	900	275	2300/440
1	150	G.E.	720	275	2300/440
1	150	Al. Ch.	1200	250	2300/440
1	100	Ridgway	1200	275	4000/2300
1	85	C.W.	1200	250	2300/440
1	75	Whse.	900	275	2300
1	75	Al. Ch.	900	250	2300
1	75	Stat	1200	250	440/250
1	25	Whse.	1200	120/240	440/250

SU—3 unit set.

DIRECT CURRENT MOTORS

Qu.	HP	Make	Type	R.P.M.
1 xxx	600	Whse.	Mill (Rev)	600
1	400	Al. Ch.	MIII	600/1200
1	250	G.E.	C D 109	1150
1	225	Whse.	G M	450/900
1	200/200	Pl. Dr.	MIII	600/1200
1	200	Whse.	MIII (Rev)	600/1200
1	150	G.E.	M P C	600
1	150	Al. Ch.	MIII (Rev)	600/1200
1 x	150	Cr. Wh.	83 H	900
1 xxx	125	Whse.	MIC-180	600
1	100/125	Rel	1085 P	600/1200
1	100	Rel	1085 T	600/1200
1	90/160	G.E.	MPL	600/1200
1 x	80/75	Rel	1085 P	600/1200
1 x	80/75	Whse.	HK 181 L	600/1200
1	80	Whse.	GK	600/1200
1	60	Al. Ch.	R 197	600/1750
1	55	G.E.	CD 158	600/1200
1	35	G.E.	CD 147	600/1200
1	35	G.E.	MP 14	600/1200
1	35	Rel	P	600/1200
1	22½	Whse.	HK 130	600/1200
1	20	Al. Ch.	R 140	600/1200
1	20	G.E.	CDM 105	575/1750
2	17½	Pl. Dr.	15 S	600/1200
1	25	G.E.	MP 15	600/1200
2	25	G.E.	CD 123	600/1200
1	25	G.E.	MP 13	600/1200
1	25	Whse.	HK 111 L	550/1000

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54-B Bucyrus-Erie Combination Shovel & Dragline, 45' boom, 24' stick, 2 yd. dipper; and 880' boom, 2½ yd. bucket; Buda-Lanova diesel engine.

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1—G.E. 801 Locomotive, 40" Ga., Armor Plate Frame, 29" above rail, 6 Ton.
1—G.E. 822 Locomotive, 44" Ga. 8 Ton. 2" Armor Plate Frame, 250 Volt.
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4—Goodman Standard 12AA Shortwall Machines.
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Width	Ply	Thickness Top Cover	Thickness Bottom Cover	Type of Duck Carcass
8"	4	1/16"	1/32"	28 Oz.
10"	4	1/16"	1/32"	28 Oz.
12"	4	1/16"	1/32"	28 Oz.
14"	4	1/16"	1/32"	28 Oz.
16"	4	1/8"	1/32"	28 Oz.
18"	4	1/8"	1/32"	28 Oz.
20"	4	1/8"	1/32"	28 Oz.
20"	5	1/8"	1/32"	28 Oz.
24"	4	1/8"	1/32"	28 Oz.
24"	5	1/8"	1/32"	28 Oz.
28"	5	1/8"	1/32"	28 Oz.
30"	4	1/8"	1/16"	32 Oz.
30"	5	1/8"	1/16"	32 Oz.
30"	6	1/8"	1/16"	32 Oz.
36"	6	1/8"	1/16"	32 Oz.
42"	5	1/8"	1/16"	32 Oz.
48"	8	1/8"	1/16"	32 Oz.

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4—350 Jeffries Machines 250 Volts D.C.
1—350B Jeffries Machines 220 Volts A.C.
6—CE Sullivan Machines A.C. and D.C.
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1—Electric Hoist complete with 150 H.P. G.E. Motor.

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1—10,000 # Nordberg Sgl Drum AC
1—26,000 # Vulcan Sgl. Drum AC with MG Set Complete
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1—6000 # Brownie Carspotter AC
1—5000 # Link-Belt Carspotter AC
1—20,000 # Amer. Hoist Carspotter AC

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1—18x16 Jeffrey single roll crusher.
1—30x20 United Iron Works single roll crusher.
1—14x24 Jeffrey single roll crusher.
1—24x24 Hercules single roll crusher.

HOISTS

1—Ottumwa Iron Works conical drum hoist, serial #8183, weight 30,000#, 1½" rope, complete with remote control and hydraulic brake. Direct connected to GE 300 HP motor, model #C9847, type ITC-5017, form M 2/60/2300 V, 870 RPM, 73½ amps, 870 secondary amps, complete with automatic switchboard.

1—Ottumwa Iron Works, single rigid cylindro-conical drum hoist, serial #4600, weight 48,000 lbs. 1¼" rope, complete with remote control and hydraulic brakes direct connected to Western Electric 150 HP. motor, model 17815, type MT-364-10-150-TBR, form B, 3 phase, 60 cycle, 440 volts, slip ring, secondary volts 353, amps. 197, secondary amps. 182, speed full load 700, serial #4063512, centimeter 49° C. Complete controller and resistance.

1—Ottumwa Hoist #2561, drum diameter 48", face 36", face grooved for 1" rope, equipped with post brake 54" diameter, hand operated, single reduction cut spur gears, 19 teeth and 196 teeth, 1¼" pitch, 10" face, drum shaft 7" diameter, drum shaft bearing 7"x14", pinion shaft bearing 4⅝"x18" of the ring oiling type.

2—New Jay, type CHD, 10 HP. car pullers, complete with Jay RP ¾ HP. DC. rope pullers.

1—Double drum American Hoist and Derrick Co. Hoist, type 2/D, Ser. No. 1771. Drum dia. 18", face 28", flange 6", complete with 100 HP G.E. slip ring motor model MPC 5546, Ser. No. 4041060, 600 RPM. 3/60/440 v., all ring bearing, complete with grids and drum control.

1—Hydraulic clutch type endless car haul machine, serial number 19440. Extra heavy type manufactured by Robbins Engineers, Inc. Normal rating 10004gr at 81 FPM, maximum rating 27,500gr approx. at 40 FPM. Fluid coupling feed for maximum torque of 525 ft. lbs., or 27,500 rope pull. ¾" wire rope. Complete with 50 HP G.E. motor, model 5KH444, Ser. #5480471, 3/60/440 v., totally enclosed.

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3—6 ton Goodman ball-bearing locomotives, 36" gauge, type 230ET.
1—6 ton Goodman ball bearing locomotive, 42" gauge, type 22-AO-47.
1—6 ton Westinghouse locomotive, 36" gauge, Class 4-2-35-C-627.
1—6 ton Jeffrey locomotive, 42" gauge.
6—6 ton GE ball bearing locomotives, 42" gauge, class EMITYMMII with EMITI-A motors.
1—4 ton Whitcomb Battery locomotive, 36" gauge.
2—4 ton Goodman ballbearing locomotives, 30" gauge, type 42-I-4-T. (with or without gathering reels).
1—30 ton Goodman ball bearing locomotive, 42" gauge, type 30AO6T.

MINING MACHINES

1—112AA Goodman DC Universal mining machine, 30" gauge, 6½ ft. cutter bar.
2—CLES, AC, 3 phase, 60 cycle, 220 volt, Sullivan longwall mining machines.
1—Sullivan Shearing Machine, Class CH11, DC, 9' cutter bar.
2—Sullivan Longwall Mining Machines, type CH3, 3/60/220 volts, 30" cutter bars.
2—12AA Goodman standard mining machines, 50 HP, 3/60/220 volts, 5' cutter bars.

MOTOR GENERATOR SETS

1—200 KW Synchronous Ridgway Motor Generator Set, 1200 rpm, 250 volts, DC, 2300 volts, AC, complete with switchboard.
1—60 KW GE motor generator set type CD 128, form A, comp. wound, 337 amps, 250 volts no load, 275 volts full load, 1200 RPM, cont. 50 deg. cont., #1530006 direct connected to 125 HP GE syn. motor type TS, form PK, frame 7588, 3/60/2300 volts, 1200 RPM, 37.6 amps. cont. 60 deg. cont. Excitation 250 volts, 6.5 amps. .76 PF. #4514971, complete with switchboard.

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3—200 KVA Moloney Electric Co. transformers, voltage 44000/22000 to 440/220. Others from 3 KVA through 75 KVA. Voltage from 7200/120/240, 2400/240/480.

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1—Stephens Adamson two deck vibrator size 4' x 10'.
1—Deckbledeck vibrator size 3' x 6½'.

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2—Dooley AC Electric coal drills, size 472 phase, 60 cycle, 220 volts.
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2—300 KW G.E. 275 v. 1200R—MPC—ATI	
300 KW West. 250 v. 1200R, Syn.	
2—200 KW G.E. 275 v. 1200R—MPC—ATI	
200 KW G.E. 550 v. 1200R—MPC—ATI	
2—150 KW West. 275 v. 1200R, SK—Syn.	
150 KW G.E. 550 v. 900R—DLC—ATI	
100 KW G.E. 275 v. 1200R—ATI	

ROTARY CONVERTERS

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300 KW G.E. Rotary, 275 v. HCC6—1200R
300 KW G.E. Rotary, 275 v. HC12—400R

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150 KW G.E. RC 550 v. 1200 RPM
150 KW Triumph 250 v. 600 RPM
100 KW West. 280 v. 600 RPM

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500	G.E.	450	MT	S.R.
350	West.	450	CW	S.R.
300	G.E.	450	IM	S.R.
140	G.E.	400	IK	S.C.
150	West.	514	CS	S.C.
150	G.E.	400	ATI	Syn.
2—100	G.E.	450	IM	S.R.
2—100	Al.-Ch.	720	AKK	S.C.
5—100	West.	1200	CS	S.C.
75	G.E.	400	ITC	S.R.

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8 Ton Goodman 500 v. 44/42" Ga. 9104C2
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